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EDUCATION

VOLUME 65 — No. 8

Making Arithmetic Live Through the Medium of Informational Problem Units
By Mary A. Shea

Thrift: A Functional Problem Unit
By Milda M. Upley

Number Experience Units for Kindergarten Pupils
By E. Mae Bentley

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By Clara E. Dexter

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By Bernice McCann and Charles O. Dalrymple

Capitalizing Children's Experiences in Arithmetic
By Mildred B. Stone

Co-operation Among Colleges
By Ellis Huntington Dana

A MAGAZINE DEVOTED *to the* SCIENCE, ART, PHILOSOPHY *and* LITERATURE *of* EDUCATION

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EDUCATION

A MONTHLY MAGAZINE

DEVOTED TO THE SCIENCE, ART, PHILOSOPHY AND LITERATURE OF EDUCATION

VOL. 65 APRIL 1945 No. 8

FUNCTIONAL ARITHMETIC NUMBER

GUY M. WILSON, *Editor*
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Professor Emeritus, Boston, University

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EDUCATION

Vol. 65 APRIL, 1945 No. 8

Making Arithmetic Live Through *the* Medium *of* Informational Problem Units

By MARY A. SHEA

Asst. Principal, Henry F. Anthony School, Portsmouth, R. I.

AMONG all the subjects taught in schools none seems to have brought so much discouragement and heartbreak to boys and girls as has arithmetic. Realizing this, leading educators in the field of arithmetic have, for some years been attempting to unearth the causes in the hope of removing from that particular member of the three R's the drab cloak of despair that has been enveloping it all too long.

The heart of the matter appears to be that "Problems not understood and having no connection with the life of the child might as well not exist in so far as the child and his community are concerned."

The usual written problem of the textbook is not a real problem. Literally speaking, any real problem, be it in the field of arithmetic or elsewhere, *challenges.* The written problem of the general run of texts consists, mainly, of one or two statements describing a situation or experience, which, in most cases, is foreign to the child's sphere of experiences, and to which an answer must be found. The child interprets the given facts as well as he can, decides what processes he is to use in solving the problem, and does the computation in a try at the answer. What challenge is there in that for either the child or the teacher? It is devoid of motivation and the working of such problems becomes a more or less mechanical procedure. When the answer is obtained, should it be absurd, the child doesn't sense it because he has not lived the problem. Under these conditions, how can we honestly blame children for lack of interest in arithmetic? To overcome this, and to improve arithmetic in our school, the Information Problem Unit was introduced.

By way of explanation, may I say that the Informational Problem Unit is exactly what its name implies. It is a unit of work in arithmetic, presenting a problem closely related to the child's community and interests, for the solution of which the child must go out, search for and gather the necessary data, information, and facts. The presentation of problems, either oral or written, in Informational Problem Units makes possible the development of life situations in the

schoolroom. Through these situations pupils learn the meaning of real problems as well as drill facts. The teacher plans certain definite aims which she means to accomplish by the use of each unit, such as the development of good business judgment, and the understanding of fundamental economic principles. Incidentally there is development of skills in computation.

Every Informational Problem Unit grows out of a situation in the school, community, city, or town. Therefore, what might be suitable for one school would not necessarily be worthwhile for another. Well-developed Informational Problem Units in arithmetic are a vital medium for the establishment of a socially-efficient citizenry because the pupils work together in a whole-hearted, cooperative manner for the successful solution of a problem with which they are acquainted and in which they have a natural interest because it is a part of their own immediate environment.

The Informational Problem Units presented in this article were carried on in two eighth grade divisions. The classes spent one period a week on this work. Thus, many units required weeks and even months for their completion. Believing that one is more interested in that which he likes, the students were asked to express their views on "The Value of the Informational Problem Units vs. the Written Problems of the Text." This was done after the students had worked on these units for the greater part of the school year. Of the sixty-nine pupils taking part, fifty-four favored the Informational Problem Units, nine favored the problems in the text, and six felt that the Informational Problem Units and the written problems of the text, both, had value.

The following excerpts are taken from the opinions expressed in writing by these eighth graders:—

"I like work on Informational Problem Units because it makes you more interested in arithmetic."—Sophie.

"The unit I am working on now I could work on forever, because I have decided what I want to do when I grow up and I am getting information as to the salary I may be able to earn and how I may plan to spend it."—Alice.

"I like Informational Problem Units because they help us to work together in a cooperative way. They also teach us to work things out for ourselves and not depend on the teacher."—Evelyn.

"I like Informational Units better than problems in the book because you make friends while working on them, for when you seek information you must write to people or ask them for help. The book problems seem more of a drudgery and are dry, while, in an Informational Unit you work on what you like and find it more interesting. In Informational units you learn about actual things in life instead of stuffy things from a book."—Doris.

"I like the Informational Units very much. I think it is fun to work out the cost of something you have always hoped to own or the cost of a trip you would like to take. I love to look up things in catalogues and figure the prices. It's fun and it never gets monotonous."—Janice.

"I don't like Informational Units because we don't work on them every

day and I lose interest in them."—Julia.

"I like the Problem Units better than the problems in the book because you find out things you never knew before. After I finished my Informational Unit to find the cost of equipping a dairy, I was surprised at the cost of things we have in our dairy."—Ernest.

"I like the Informational Problems Unit because they make arithmetic real. When you have to sit and think out why Mr. Jones does this or that, instead of thinking about what interests you, it isn't so much fun."—Arnold.

Among several interesting units developed during the course of the school year were the following:—

1. To determine the cost of building a chicken house for 200 chickens and to determine the profit made on 200 chickens in one year through the sale of eggs.

2. To determine the cost of running a kennel of 6 dogs for one year.

3. To find the cost of preparing a Christmas Dinner for twenty-five people.

4. To determine the cost of building a seven room house. (boys)

5. To determine the cost of furnishing the seven room house of the above unit. (girls)

6. Determining the cost of seeding the lawn and laying cement walks in own yard.

7. To determine the cost of a college girl's wardrobe for the first year.

8. Equipping a small machine shop for 5 boys.

9. Equipping a modern dairy.

10. Determining the cost of building a modern barn.

Two of the above units are presented here in detail:—

A. Informational Unit

Aim

To determine the cost of running a kennel of six dogs for one year.

Dogs—6 (1 male and 1 female of each kind)

Kinds—

1. Cocker Spaniel
2. English Setter
3. Irish Setter

---

1. Cocker Spaniels (in pairs)

Amount and cost of food for one day for one dog

Meat scraps—½ lb. @ 5c . . . $ .02½
Dog grain ½ cup 01
Bread (1 slice) 01

Multiplied by 2 equals $.09 for 2 dogs

Cost of food for 1 month for 2 dogs
30 x $.09=$2.70

Cost of food for one year for two dogs
12 x $2.70=$32.40

---

2. English Setters (in pairs)

Amount and cost of food for one day for one dog

Meat scraps—1½ lb. @ 5c . . $ .07½
Dog grain 1½ cups 02½
Bread (2 slices) 02

$ .12

12 x 2=$.24 for 2 dogs

Cost of food for one month for 2 dogs
30 x $ .24=$7.20

Cost of food for one year for 2 dogs
12 x $7.20= $86.40

3. Irish Setters (in pairs)

Amount and cost of food for one day for one dog

Meat scraps—1½ lb. @ 5c. .	$ .07½
Dog grain 1½ cups.....	.02½
Bread (2 slices).....	.02
	$ .12

12 x 2=$.24 for 2 dogs

Cost of food for one month for 2 dogs
30 x $.24=$7.20

Cost of food for one year for 2 dogs
12 x $7.20=$86.40

4. Incidentals

License for running a dog kennel for one year.....$10.00

Injections

1. Distemper—@ $25 per dog (6 dogs).....150.00 (three injections which last for life)
2. Rabies—@ $3.50 per dog (6 dogs) ..... 21.00 (when state is quarantined)
3. Poison in system—@ $3.00 per dog (6 dogs).. 18.00 (in case it is eaten by accident)

Medicine

1. Worm tablets—@ $.60 per pkg. (12 per pkg., using 6 per year per dog requires 36 or 3 pkgs..... 1.80

Collars—6 @ $1.00 each.....	6.00
Harnesses—2 @ $1.00 each...	2.00
Leashes—6 @ $.50 each.....	3.00

5. Summary

$ 32.40	(for food for Spaniels for one year)
86.40	(for food for English Setters for one year)
86.40	(for food for Irish Setters for one year)
10.00	(for license for kennel)
150.00	(for injections) distemper
21.00	(for injections) rabies
18.00	(for injections) poison
1.80	(for medicine)
6.00	(for collars)
2.00	(for harnesses) for Spaniels
3.00	(for leashes)
$147.00	Total Cost

B. Informational Unit

Aim

To find the cost of furnishing a Christmas Dinner for 25 people, based upon the following menu:

Fruit Cocktail
Roast Stuff Turkey
Carrots Turnips
Mashed Potatoes Sweet Potatoes
Cranberry Sauce Squash
Buttered Rolls
Lettuce Hearts with Russian Dressing
Ginger Ale
Plum Pudding with Vanilla Sauce
Mixed Nuts
Candy Mints

Article	*Cost*
Rolls—5 doz. @ $.20.....	1.00
Butter—2 lbs. @ $.43.....	.86
Cranberry Sauce—4 cans @ $.19 ..... (1 can serves 8 people)	.76
Turkey—31 lbs. @ $.52..... (allowing 1½ lbs. per person)	16.12
Turnip—5 lbs. @ 5c.....	.25
Fruit Cocktail—4 cans @ 29c.	1.16
Ginger Ale—9 bottles @ 15c..	1.35
White Potatoes—1 pk. @ $.50.	.50
Lettuce—2 heads @ 23c.....	.46
Sweet Potatoes—6 lbs. @ 3 lbs. for 29c	.58
Mints—6 pkgs. @ 5c per pkg..	.30
Mixed nuts—2 lbs. 35c.....	.70
Plum Pudding—7 cans @ 38c per can	2.66
Total	$26.70

A group of eighth grade girls decided to give a Christmas banquet for their division with their teacher as guest of honor. Each girl in the group was assigned one item of food and it was her job to ascertain the amount of that particular item needed for 25 people and the cost of the same.

The entire group of girls, working together, planned the menu cards and decorated the covers. One girl typed all of them.

The carrots and squash were donated by one of the parents.

This was a most enjoyable unit and paved the way for very excellent planning of the class banquet the following June.

Another exceptionally splendid unit was carried on by each girl in one eighth grade unit. The aim of each unit was to find the cost of running each girl's home for one month. After dinner each evening each girl would sit down with her mother and tabulate the household expenses for that day as given to her by her mother. This was continued for one month and proved very informative to the class and highly interesting to mothers as well as the girls.

Need more be said to justify the statement that the Informational Problem Units can and should take the place of the written problems of the texts? They come directly from life; they affect life; they are a part of sensible living; they develop judgment in the business of living.

"In the process of winning this war the American people have accepted centralization of government, regimentation of activities and restriction of liberty to a greater extent than ever before in their history.

Totalitarianism has an insidious, a sinister appeal. It appeals to those who prefer leadership to initiative, blueprints to enterprise. It appeals to those who find it difficult to bend democracy to serve their economic or political self-interest.

At the end of the war the freedoms we have lost must be re-won and restored, not part, but all of them; not sooner or later, but sooner. If we fail to do that, then history will write it down that in this war—as in many others—the victors were the vanquished."

—Wendell Willkie

Thrift: A Functional Problem Unit

By MILDA M. UPLEY
Fifth Grade Teacher, Billerica, Mass.

I. INTRODUCTION

THE child of today will be a citizen in a world far different than that of today. Educators cannot teach him from textbooks that were written at a time when the world was going at a slower tempo. We must adjust our curriculum to a different, faster method of living.

Kilpatrick has made a strong point in favor of functional units in stating that "Education is not acquiring specified subject matter fixed in advance; it is the continuous remaking of life by acquiring subject matter as it is needed for present behavior. When we can see this and understand the necessity for the unit of self-hood, then we shall see why drill, though necessary, must be subordinated to life — why the school, to be finally satisfactory, must be continuous with life."[1]

The functional problem unit is the answer to the teacher's question, "What shall I teach in problem Arithmetic so that my work will satisfy the need of the child, and help him to attain a definite goal and not encumber him with useless knowledge that will confuse more than assist him?"

II. APPROACH

There is really no definite approach to a functional unit since the functional unit must arise from a definite need of the child. Real experience must be the basis.

Since these problem units were the first to be introduced into my particular school system, several elements were taken into consideration,—

1. The pupils
2. Text
3. Course of study
4. Parents

As originally planned, the unit on "Thrift" embraced merely the topic "Saving." A very important factor changed this plan completely.

A request from the superintendent's office asking teachers to be very careful of school supplies was sent to each teacher.

This notice was read to the class and almost immediately there arose definite need to gather information in order to answer the question "How can we save material?"

III. UNITS

A. "Thrift — Saving Supplies"

In order to save school supplies, it was necessary to know certain items. Two questions raised were "What are the things we use?" and "What do they cost?" After the beginning of this unit, a third item was added, "How much of each supply do we use?" The first step was to make a list of the materials used. This list included such items as: pencils, rulers, pens, stars, books, notebooks.

The children were then asked what they thought each article cost. Only one item, pencils, was fairly accurate.

Then a catalogue was secured from

1 Kilpatrick: "American Effort at Appraisal." Twenty-fourth yearbook of the National Society for the Study of Education. Part II, Section VI, Page 286.

the J. L. Hammett School Supply Company of Boston, to check the prices on the various articles. The first item chosen was pencils.

The following are the original questions given by the class:

1. How many pencils does each child use in a year?

Each child was given a pencil at the beginning of each month. The answer was ten pencils.

2. How many pencils does the room use in a year? Four hundred and thirty pencils.

3. How much does each pencil cost?

The catalogue listed the price of pencils as $1.80 a gross. What was a gross? The dictionary was consulted and it was discovered that a gross meant twelve dozen. This meant 144 articles in a gross. What was necessary to be done in order to find out what one pencil cost. Divide $1.80 by 144.

4. How many pencils are used in the entire building? (Average number of pupils was 340.)

Thirty-four hundred pencils a year.

5. How much does it cost for all the pencils in the room?

At $.01¼ a pencil, 430 pencils in one year would cost $5.37½.

6. How much does it cost for the entire building?

Thirty-four hundred pencils in a year at $.01¼ a pencil. The cost would be 3,400 at $.01¼ or $42.50.

Questions raised by the children for other supplies were:

Pens

1. How many pens are used by the class in a year?

2. How many penpoints does the school use?

3. How many gross do we use in a year?

4. How many gross does the entire school use?

5. How much would penpoints cost for the entire school?

Paper

1. How many pieces of arithmetic paper do we use in a week?

2. How long would one package last us?

3. How many sheets of arithmetic paper do we use in a year?

4. How many packages do we use in a year?

5. How much does it cost the school department for paper for our room?

B. "Thrift in Health and Spending"

As planned at first, the next unit was to point out that people could be thrifty with their health as well as their money and supplies. It proved, also, that it could be used as part of our thrift definition, — "Thrift is Wise Spending." This unit attained results that not even the teacher dared expect.

The first step was to list original definitions of what the word "health" meant to the children. These definitions were finally condensed to Rest, Exercise and Food.

In the discussions of food, there soon arose a need of some means of measuring the food eaten. At first pounds and ounces were sufficient. Then it was discovered that one slice of bacon or a glass of milk could not be successfully measured in pounds and ounces.

A bulletin "Feeding the Adolescent"[2] introduced a word new to the entire class — calorie. The dictionary was consulted.

2 "Feeding the Adolescent" Massachusetts Department of Public Health, Boston, Massachusetts.

The bulletin gave a list of ages and calories per pound for each child. Each child multiplied his weight by calories. The children next made original menus and checked the food for caloric value. When these were added, more food was eaten than was listed for the weight and age of approximately every child.

Using the Federal Health bulletin "Diet for the School Child,"[3] a balanced week's menu was planned. It was discovered that candy and cake had not much place in the menu. This work involved addition, multiplication of whole numbers and multiplication of fractions. A sample menu worked out was:—

BREAKFAST

	Quantity	*Caloric Value*	*Our Value*
Oatmeal	½ cup	½ cup – 50 c.	50 c.
Stewed prunes	3	4 med. – 100 c.	75 c.
Bread	2 to 3 slices	1 slice 100 c.	300 c.
Butter	1 tbsp.	1 tbsp. 33 c.	33 c.
Cocoa	1 glass	1 glass 150 c.	150 c.
			608 c.

After this the class decided to find out what one person in the fifth grade ate in one week. In order to know how much to buy of each article, the "Table of Ordinary Household Measurements and Quantities Commonly Purchased"[4] was used.

When the list was completed. an advertisement of a First National Super Market was used to check the prices.

These items were added for the entire week. The final answer was $4.76. (These, of course, were prewar prices.)

Example

				Cost	*Cost to us*
Eggs	8 eggs used	What part of a dozen do I need? 8-12 or ¾ doz. Shall I buy large or medium eggs?	Eggs are sold by ½ or doz. Buy 1 dozen.	.35	.35

Then with the help of a bulletin "Weekly Food Order for a Family of Four"[5] the class figured out what it cost for the average family in the class.

Example

Milk	25 qts.	.14	$3.50
Cheese	½ lb.	.27	.14

The children were not asked what they thought about this new type of work but their reaction to the weekly problem lesson was carefully noted.

1. A similar order in the arithmetic book was "far easier than the one we did."

3 "Diet for the School Child." No. 2. Federal Health Education, Washington, D. C.
4 "Table of Ordinary Household Measurements and Quantities Commonly Purchased"—"Hygiene Library Education Association" 303, Fifth Avenue, N. Y., (1928). Page 1015.
5 "Weekly Food Order" Prepared by the Nutrition Division of Community Health Association, Boston, Massachusetts.

2. There was satisfaction and security in attacking problem work.

3. The class, even the slower group, thought in terms of problems.

4. Problem Scales administered at the close of these units were considered by the majority of the class to be like third grade work. This was a fifth grade.

IV. CONCLUSIONS

The following statements were justified by test results given at the close of the units:

1. The child's experience plays a vital part in achieving the correct answers to problem work.

2. Large numbers are reduced in difficulty in meaningful problems.

3. Errors are greatly reduced when problem work is supplemented by real life situations.

4. Success of children who have low I. Q.'s can be improved when problem work is vital.

5. Meaningful problem work can be an inspiration for advanced work for children with high I. Q.

6. Work on informational units improves judgment and choice of values, not alone in problem work.

In the eyes of the real teacher, such results are proof enough that the extra work and time she has given in presenting these units is worthwhile.

Here was work beyond the ability of fifth grade children; I thought so and others thought so. But the children were interested and wanted the answers. They persisted; I merely gave them the time, one day a week, and helped them all I could. It was real work for all of us, but very worthwhile.

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Number Experience Units *for* Kindergarten Pupils

By E. MAE BENTLEY
Parker School, Watertown, Massachusetts

EVEN in the Kindergarten, children ranging from four years-nine months to five years-5 months can get great enjoyment and benefit by participating in number experience units.

One unit worked up for a Mothers' Day Program is typical. It gave the children plenty of opportunity to learn actual number experiences. These number activities can be made a part of any Kindergarten child's every day living experience.

As the title suggests, Mothers' Day Program developed into planning a party for the Kindergarten children's mothers. Interest is always high when a party is under consideration. The planning was done by the children with guidance from the teacher. Here are some things the group found out that they needed to know: One, the number coming to the party; two, the number of invitations to print; three, the amount of crackers, peanut butter, ginger ale to be bought, prepared and served. Small groups were chosen to go to the stores and do the purchasing. They reported to the class how much each item cost. One group brought the paper napkins and paper cups. This too was reported upon. Another group counted and folded the right number of napkins. So many paper cups were placed for the gingerale. The group discovered that four or five cups could be filled from a large size gingerale bottle. The right number of peanut butter crackers were to be prepared plus a few extra for emergency. Every child took part in some way in the unit. Some served the refreshments to the guests.

At another time, the children planned a short entertainment consisting of songs, poems and dances learned in school. Many of these brought in a number situation, for example: Sing a Song of Sixpense, Three Little Kittens, Two Little Kittens Began to Quarrel, Ten Little Indians, Baa, Baa Black Sheep, Hickory Dickory Dock, Diddle Diddle Dumpling, etc. A grand time was had by all, and needless to say, a most profitable one in number experiences.

Another number experience unit was worked out in this average Kindergarten at Christmas time. It is a Christmas custom for the Kindergarten children to draw names, and then each child buys a gift for the boy or girl whose name he has drawn. This present isn't to cost more than ten cents. So a plan was developed for taking the group to the nearby Five and Ten Cent Store. The children selected their gifts. Before the trip was taken, there was a discussion of presents that might be purchased for ten cents. A list was made on the blackboard. This gave the class an

idea of money value. Each pupil learned to recognize a dime. He learned what made a dime,—two nickels, or ten pennies, or five pennies and a nickel. At last the long-looked for morning arrived, and all went to the Five and Ten. On the way many parked automobile numbers were observed. We passed many of the children's homes en route, and we stopped and read the numbers on the houses. It did not take long for the children to make a choice. There was no confusion, — just a busy hum.

The children returned to school that morning with many values in addition to the presents which they had purchased. They had lived numbers. They had experienced the real purpose of all elementary number work, — familiarity with the tools needed for simple purchase, for business. These children were also motivated to want more, to go further. With more work of this nature in the lower grades, there will be a better understanding of the real aims, purposes, and materials of profitable number work, later on in the grades. They will enjoy arithmetic, instead of hating and avoiding it.

FUTURE TEACHERS OF AMERICA

PLEDGE

The good teacher requires:

PHYSICAL VITALITY. I will try to keep my body well and strong.

MENTAL VIGOR. I will study daily to keep my mind active and alert.

MORAL DISCRIMINATION. I will seek to know the right and to live by it.

WHOLESOME PERSONALITY. I will cultivate in myself goodwill, friendliness, poise, upright bearing, and careful speech.

HELPFULNESS. I will learn the art of helping others by doing helpful things daily in school and home.

KNOWLEDGE. I will fill my mind with worthy thoughts by observing the beautiful world around me, by reading the best books, and by association with the best companions.

LEADERSHIP. I will make my influence count on the side of right, avoiding habits that weaken and destroy.

These Things Will I Do Now that I May Be Worthy the High Office of Teacher

What Is Functional Arithmetic?

By GUY M. WILSON
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Raytheon Manufacturing Company, Newton, Massachusetts
Professor Emeritus, Boston University

"SOCIAL Utility Arithmetic," "Useful Arithmetic," "Child Life Arithmetic," "Every Day Arithmetic," "Real Life Arithmetic," "The Arithmetic We Use," — these are the newer titles for arithmetic texts. In the titles and in the prefaces, the authors and publishers have fully accepted the "usefulness" or social utility viewpoint for arithmetic. And there has been decided improvement in the content of arithmetic textbooks since the epochal studies of usage of arithmetic by Wise, Woody, Wilson, Charters, Thorndike, and others a quarter of a century ago.[1] But the road has been hard, and the forces of tradition have been strong and well entrenched. Some "psychologists and educational leaders" still claim that mental discipline is the better guide in Arithmetic. Few call it mental discipline; but "systematic development," "development of powers," "the discipline of mathematics," when reduced to lowest terms, all mean mental discipline. And mental discipline is not a discriminating or helpful criterion. All of the sins in the decalog of mathematics teaching can be committed under the guidance of mental discipline, and it should be completely abandoned as a criterion. It has heaped upon the child an impossible burden, and it has yielded little profit. It has, no doubt, discouraged and turned away innumerable potential scholars in the field of higher mathematics.

To be functional, arithmetic must enter usefully and enjoyably into the lives of children and adults; it becomes not a thing of the book, but a part of life. It shares the original purposes of arithmetic in the American Colonies, either, (1) A valuable tool applicable to the affairs of daily living, trade, and industry, or (2) A great field for interest enjoyment, and recreation,—one of the best. At higher levels, mathematics does again become a useful tool in manufacturing, engineering, and research.

Functional arithmetic is developing along three lines:—

1. Reduction of the drill load to the processes used enough by adults to justify mastery. The drill load is now generally accepted as including only addition, subtraction, multiplication, long division, fractions in halves, thirds and fourths (occasionally 8th and 12th, each by itself alone), a reading knowledge of decimals, and a general understanding of percentage.

The level of mastery has been moving steadily toward 100% mastery in the useful fundamentals. A 75% class average means that about 10% of pupils have no errors. If 90% of pupils make errors on a simple test in addition of whole numbers, it is just

1 See reference 7 of bibliography.

about the same as nothing. The schools can not justify their efforts and costs on the basis of such results. With a load that is reasonable and right, all normal children properly taught, can reach the 100% standard.

2. The abandonment of isolated textbook problems, and the substitution therefor of functional problem units that connect directly with the lives of the children and the activities of the community.

How far a recent textbook series has missed this goal is shown in the research by Miss Clara Dexter, briefly summarized in this issue.

The right approach to functional problem units is suggested in the articles by Bentley, Gallagher, Shea and Upley.

Here is a job for the teacher who has learned to develop pupil experiences, home duties, and community activities. It is probable that this job can never be done by textbooks, although some help may be given to the untrained teacher. In this job lies the real heart of functional arithmetic.

Much of the research on written problems in recent years has not been a credit to the profession. It has been research on how best to do something not worth doing. The question has been, "What will help most to enable pupils to solve these (meaningless) isolated textbook problems? Is it reading ability, or knowledge of fundamentals, or mastery of mathematical vocabulary, or a different form of statement of the problems?" Kramer[2] has shown that none of these items makes much difference. A proper set of criteria[3] would call for complete elimination of the isolated text problem. The big difference comes when problem units are properly set up. Then there is no vocabulary difficulty, or process difficulty, or insurmountable difficulty with fundamentals. When the pupil knows what it is about, and has good reasons, personal reasons, for wanting the answer, then these other factors become trivial. Just now we need help on locally developed problem units.

3. Recreation and further progress in the field of arithmetic and mathematics on a choice basis for those who enjoy this field.

This phase of the work is developed rather fully in Chap. 28 of Teaching the New Arithmetic, (McGraw-Hill Book Co., New York, 1939). The teacher must learn how to carry forward the pupils who are interested or promising. The appreciation approach to difficult fractions, decimals, measures, mensuration, square root even, and algebra, has great possibilities. The drill approach is not justified, and it is discouraging to children. The appreciation approach in the hands of a skillful teacher can reach most if not all children with the beauties and powers of mathematics, and it will save the capable for further work in the field.

The next twenty-five years should see a general acceptance of the functional view of arithmetic. It must begin in teacher training centers. It involves a vision in terms of child experiences and adult usage. It calls for more preparation by teachers who train, — preparation in higher mathematics, yes, but particularly preparation through community contacts, studies of usage in industry, — prob-

2 See reference 14 in bibliography.
3 See reference 15 in bibliography

ably, experience on actual jobs in industry. Nor must the children be neglected; good problem units start with pupil leads.

Any supervisor or trainer of teachers will be inspired by reading the researches in the field of usage. The earlier studies by Wise, Woody, Wilson, *et al* are readily available in summary form. The larger and more discriminating studies by Dalrymple on fractions in business, Russell on decimals in industry, Cassell on useful measures, and Yorke on the metric fallacy, are available and should carry conviction, — conviction that the demand for a sensible program for children is based upon adequate and convincing data. This better program can not be pushed aside as just some one's opinion.

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Insurance: *an* Informational Problem Unit

By MRS. JOSEPH E. GALLAGHER
West Quincy, Massachusetts

THE problem of life insurance should find a place in Junior High School Mathematics. Although insurance for fire, theft, and liability seems to be provided for, life insurance is often neglected. The development of insurance-consciousness, connoting an appreciation of the many phases of the subject, is a worthwhile and needed undertaking. Insurance, too, is an excellent subject for a written problem unit.

Wilson states: "Written problems should be based upon large sizable thinking situations, and usually developed in the local community; they should be well within the comprehension of the child and should appeal strongly to his interests; they should not be primarily computational, but informational; they should develop understanding of business and judgment in the expenditure and use of money."[1] Reflective thought on these requirements as they pertain to insurance reveals that the problem of insurance adequately fulfills all the conditions of a written problem unit.

The objectives of such a unit should be that it should furnish a background of appreciation of insurance; it should show that insurance is a realistic need in everyday living; it should teach that part of the family budget should be allocated to insurance; and it should develop judgment in the selection of the kinds of insurance a family should buy. The development of mathematical ability to compute the finances of insurance assumes a subordinate or incidental role.

In order to demonstrate a plan of how a life insurance unit might be developed, let us assume that John Adams, an eighth grade boy, aged fourteen, is going to formulate a life insurance plan for his family who at present carry no insurance. Mr. and Mrs. Adams are both 40 years old and John's sister, Ann, is 10. Mr. Adams's income in $3,000 a year. (An imaginary family could replace John's own family.)

The appreciation technique should be used as the major technique. With exhibits, talks, and reading it may be assumed that John is exposed to the history of insurance, types of companies, kinds of insurance, and basic principles of insurance. If budgeting is a new problem, it may be possible for John to make up a family budget or he may use one of the many published ones.

As protection and investment are considerations, John finally decides from his study of budgeting to allot $300 for his family. His problem now is to determine what kind and how much insurance to buy. Before making a selection he must know how much the different kinds cost. Choosing the charts of one of the major insurance companies from the *Flitcraft*

1 Wilson, Guy M., "What Arithmetic Shall We Teach," p. 118, Riverside Press, Cambridge, 1926.

Compend[2] or using multigraphed charts provided by the teacher, John learns how to compute the cost of the different types of insurance at various ages and also the cost of double indemnity and waiver of premium features and what those terms mean. He knows how to find the answer to such questions as: "What will it cost a man 30 years old to take out life insurance for $1,000 on the 20 Payment Life plan including double indemnity and waiver of premium?"

John must now decide how much and what kinds of insurance his family should buy. Considering the children first, John decides financial protection is necessary to the extent of funeral expenses in case of death. Consulting the insurance charts, John finds the following:

For 10c weekly, with double indemnity and waiver of premium included at no extra cost, he has the following to choose from:

Life Paid Up at 65.....
Ann is insured for $244
John " " " $222

20 Payment Life.....
Ann is insured for $148
John " " " $138

Double Protection at 65.....
Ann is insured for $288
John " " " $264
After 65—½ that amount

John decides that the 20 Payment Life policy does not give enough insurance. The Life Paid Up at 65 is adequate and he likes the idea of not paying premiums after 65. The Double Protection at 65 policy would give the children $44 and $42 respectively more than the first option, but at 65 would give $144 and $132 respectively. John concludes that the Life Paid Up at 65 option is best, thereby assigning $10.40 of the insurance budget allotment of $300 to Ann and himself.

For John's mother, the idea of protection is of primary importance. Funeral expenses and costs of last illness should be provided for. A thousand dollar policy appeals to John. He finds these plans:

$1,000 policy at age 40: (with double indemnity and waiver of premium)

I. Whole Life Paid Up at 85 would cost $35.27 annual premium[3]

II. Paid Up Life at 65 would cost $41.20 annual premium

III. 20 Year Endowment would cost $56.02 annual premium

John thinks that the 20 Year Endowment might take too much of the budget allotment and that, presuming that his mother lived after age 60, she would then carry no life insurance. He also thinks that although Plan I is cheaper, premiums would have to be paid after the normal earning time was past.

John decides upon the Life Paid Up at 65 plan thus using $41.20 of the insurance allotment. This with the children's premiums would leave a balance of $248.40 for his father's insurance.

John's charts show him the following plans:
Age 40 — $1,000 policy

2 "Flitcraft Compend," Flitcraft Incorporated, Illinois, 1944, 640 pp.
3 All of the figures quoted are taken from the charts of one of the major insurance companies in the "Flitcraft Compend."

	Premium	*Waiver of Premium*	*Double Indemnity*	*Total Premium*
Plan I				
Whole Life at 85	$32.58	$1.60	$1.09	$35.27
Plan II				
20 Payment Life	43.58	1.22	1.25	46.05
Plan III				
Life Paid Up at 65	38.50	1.45	1.25	41.20
Plan IV				
Double Protection to 65	55.78	2.10	1.09	58.97
Plan V				
Family Income	41.85	1.79	1.09	44.73
Plan VI				
20 Year Endowment	53.57	1.43	1.02	56.02
Plan VII				
Retirement Income at 65	62.17	2.14	1.09	65.40

From this chart John finds that:

Plan I	$246.89	will buy	$7,000	insurance
" II	230.25	" "	5,000	"
" III	247.20	" "	6,000	"
" IV	235.88	" "	4,000–8,000	insurance
" V	223.65	" "	5,000	insurance
" VI	224.08	" "	4,000	"
" VII	196.20	" "	3,000	"

John now debates the different plans:

Plan I. A $7,000 policy can be bought for $246.89 per year. This is the cheapest plan. However, premiums would have to be paid until age 85.

Plan II. A $5,000 policy can be bought for $230.25 per year. There would be no further payments after age 60. It costs less in total premiums than Plan I and yields $2,000 less insurance.

Plan III. A $6,000 policy can be bought for $247.20 per year. There would be no further payments after age 65. The cost is about the same as Plan I and there would be $1,000 less insurance.

Plan IV. A $4,000-8,000 policy can be bought for $235.88 per year. This means that if Mr. Adams died before age 65, his wife would receive $8,000. If he died after that age, $4,000 would be received. There would be no further premium payments after age 65.

Plan V. A $5,000 policy can be bought for $223.65 per year. This means that if Mr. Adams died within the next twenty years, Mrs. Adams would receive $50 a month for the rest of the twenty years and then full face value of $5,000. Premiums would have to be paid until death or age 85.

Plan VI. A $4,000 policy can be bought for $224.08 per year. In 20 years (Mr. Adams would then be 60 Years old) he would receive the full

value of the policy. Many insurance companies give options on extended insurance whereby the family might receive the money in smaller amounts over a limited period of time.

Plan VII. A $3,000 policy can be bought for $196.20 per year. This plan would give an income of $30 a month for life (10 years certain) at age 65 and the family would have the protection of $3,000. Premiums would be paid up at age 65.

John makes his choice by the process of elimination. It is understood that the difference in the insurance cost and the budget allowance will be put into savings. Plan I appeals except for the fact that the premiums would have to be paid beyond the average earning time. He discards Plan II in favor of Plan III, as $1,000 more insurance can be bought for $17 more, even though the premiums have to be paid to age 65. John discards both plans in favor of Plan I.

Plan IV appeals. The family would have the best protection during the children's school and non-productive years. Under Plan V, John debates that in the event of Mr. Adam's death before age 60, the $50 a month would help greatly for the balance of the 20 years and there would also be $5,000 insurance payment for Mrs. Adams at age 60. However, if Mr. Adams lived, he would have to pay $223.65 a year for premiums until age 85 or death. This might be difficult. Plan VI gives John's father, when he becomes 60, the use of the money he has saved for the family protection. However, the family would have had only $4,000 protection instead of the larger amounts of the other options. Furthermore, after age 60, the father would not be carrying any life insurance.

Plan VII gives only $3,000 protection, but John notices that a combination of Plan VII and IV is possible. Under Plan VII, $196.20 will buy a $3,000 policy and under Plan IV, $58.97 will buy a $1,000-$2,000 policy at a total cost of $255.17. This plan would give an income of $30 a month for life, 10 years certain, at age 65 and the family would have the protection of $3,000. A Double Protection policy would give $2,000 additional protection to age 65 and a death benefit after 65, of $1,000. All premiums on both policies would be paid up to 65. This would cost $6.77 more than the budget allowance. Presuming that the children go to college, John will be through college when his father is 48 and Ann will complete her course when Mr. Adams is 52. It might then be possible for Mr. Adams to increase his retirement income by further annuities thereby establishing further security for old age.

Although Plan VII and IV combination appeal to John, he decides that a retirement income plan may be deferred until later, and that protection is the greater need for the next eight years or more. Therefore he makes the momentous decision in favor of the Double Protection $4,000-$8,000 policy because it will give his mother the greatest protection when she might need it most.

John finds in the charts of the mutual companies tentative 10 and 20 year dividend exhibits and discovers that dividends may be applied either to reduce the premiums or may be applied to the face of the policy. (As these dividends are tentative, it has not seemed practicable in this discus-

sion to use them in the computation.) From the charts, John also finds out the cash surrender value of his policies.

To develop judgment in insurance programs, such problems as John's family problem might be worked out for other income brackets and different ages. Plans for large incomes are not advised as an insurance expert should be consulted for such programs.

If, at the completion of this unit, the pupils have developed an understanding of the need for insurance and the benefits derived therefrom; if they have a knowledge of the types of insurance with their advantages and disadvantages for certain incomes; if they are familiar with the insurance rate charts and know how to use them; and if they have developed judgment in the selection of types to meet various incomes, the unit should have proven itself of immeasurable value.

A Problem Unit on life insurance will be recognized as having great value. It is of major importance. It can very properly take the mathematics period for one day each week for an entire semester, ($\frac{1}{2}$ year.) As long as this unit runs, it will be the "written problem work." The brief sketch, given above, will need to be studied by pupils and teacher. It is a little difficult; it will develop slowly. The teacher will need to be diligent and resourceful. There should be no pressure. All will work cooperatively together. Leads and data will be readily secured from insurance companies and the homes of the children. The unit will be very interesting; truly functional problem work always is interesting and very worthwhile.

Taking Care *of the* School Supplies[1]

By EVELYN R. LINDQUIST
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OUR class takes care of the supply closet for the school. We think it is an important and responsible job. It's fun, too! We keep the supplies in good order so that we can easily find the materials. Each day we fill orders which are sent to us by the teachers. We also keep records of the supplies that each room orders. It seems just like a little store. We even give free delivery!

Shall we tell you how we take care of it?

I. *Getting acquainted with materials in the supply closet.* In the fall the first thing we did was to get acquainted with the supply closet. We went in by groups to look over the supplies. We were amazed to see so many things that we use in school. Some of the children brought materials into the room so that we could learn the names of the articles we were to handle. On the packages we found names we had never heard of before, such as bogus and manila paper. We learned that paper comes in different sizes and is ruled in different widths, such as ½ inch, ¼ inch, ⅜ inch, and ⅝ inch. We found out about ream, quire, and gross. One week all of our spelling words came from words we needed to use in taking care of the supply closet.

II. *Getting the supply closet ready.* Before we started to fill orders we had to arrange the supplies so that we could quickly find them when filling an order. We made signs for each section of the closet. Some of them are, "Desk Materials," "Blackboard Needs," "Paper," and "Physical Education Equipment."

The closet was so dull and dark we decided to do something about it. We trimmed the shelves with yellow and green paint. Now it looks as if the sun were shining in there.

III. *Filling orders.* We all wanted to work in the supply closet but there is not enough room for all of us. We decided that we should choose two children each month to be the captains. Anyone who has this job must be trustworthy and good in arithmetic.

The captains take care of the orders from the different rooms. Each item is checked off on the order blank by the captain. He signs his name on the order when it is filled. The order must be checked by someone else before it is delivered to the teacher.

This is a sample of our order blanks.

1 This unit on the care of the school supplies was planned by the teacher, Miss Louise H. Borchers, and developed with the help of a class of twenty-six fourth and fifth grade children. It is told in the words of the children as they gave it to the principal.

SUPPLY ORDER

Name _____ Date _____

Am't	Article	Description

Filled out by —

Checked by —

IV. *Making records and keeping reports.* Each time a teacher's order is filled out, the order sheet is put into a file by the teacher's name. At the end of two months we use these order sheets to make a record of all the supplies ordered by each teacher. We call this the "Bi-Monthly Report." We make this record so that we will know how much material has been used by each room for the year. It is quicker than looking at each order blank. We file these reports in a box called "Yearly Records."

Here is a sample of a bi-monthly report.

Twice a year a group of children take an inventory of supplies. Each child works at a different section of the closet counting the materials. The numbers are written in a booklet which has a list of the supplies. Another group checks the numbers to make sure that they are correct. We send a copy to our principal and we keep a copy in the supply closet.

In May we have two records to make for the office. One will show the total cost of supplies for each room in the school. We have already started to look up prices for some things in the catalogs. There will be a lot of arithmetic to do.

The other report will show all of the

Miss _____ Months _____

Amount	Supplies
2 pkg.	Ditto paper
2 sheets	Ditto carbon paper
1 pkg.	manila paper 3/8" LW
	etc.

supplies we have used this year. Our principal says that this record helps her the most for it shows her what she needs to order for the next year. Here is a sample from the record the pupils made last year.

Materials Used From the Supply Closet

Paper	Used 1942-43	1943-44
arithmetic 6x9″	30 pkgs.	31 pkgs.
9x12″	3 "	0 "
manila lined — spaces 1″	4 "	6 "
" 5/8″	0 "	6 "
" 1/2″	24 "	19 "
" 3/8″	29 "	16 "
white lined — spaces 5/8″	0 "	0 "
1/2″	21 "	16 "
3/8″	10 "	13 "
etc.	etc.	

V. *Checking in new supplies.* One of the things we like to do is to check in new supplies. Twice a year we get supplies. Last October when the boxes started to come in, our janitor brought them upstairs and placed them at the back of our room. Different children opened the boxes and counted the articles in each box. Our principal came up with her order list and as we gave her the name of the article and the amount, she would check it off on her list.

VI. *Using arithmetic.* You have to be good in almost everything to work in the supply closet. Arithmetic is about the most important for you use it in many ways. Some of the arithmetic we used was, (1) counting to take inventories and to check in new supplies; (2) learning different measurements of paper and spaces on ruled paper; (3) counting by 2's and 5's to fill orders quickly; (4) adding to find totals of supplies used by each room; (5) learning how many things make a dozen, a gross, a quire, and a ream; (6) finding the cost of supplies.

We like to take care of the school supplies because we have fun while we are working. Our principal tells us that the unit provides good training in book-keeping, and that this was one of the original purposes of Arithmetic as developed in the early Colonial days.

A Problem Unit: Buying a Car

By ELEANOR G. BROWN
Wollaston, Massachusetts

THE use of a functional problem unit to teach arithmetic in grade eight gave the boys and girls many practical applications of business procedures. The functional problem unit used was "Buying a Car."

To commence the work of the unit the members of the class selected the type of new car which they wished to own and then they secured the prices. From that start each pupil developed his own individual unit. The pupils also decided to use the salary, which they would receive from the work they planned to do as adults, as a basis for proper expenditures.

The following unit shows how one pupil carried on his work on the problem.

Ray Anthony wished to buy a Plymouth coupe priced at $920. Would he have sufficient money after his other expenses were paid? To determine this Ray did the following work.

Ray was thirty-five years old and earned three thousand dollars ($3000) as a cashier in a bank. He lived in the suburbs of a city with his wife and two children, a girl, aged eight years, and a boy aged six years.

It was necessary to budget his salary to cover the following items of expense for this family:

Expenses for Family for the Year	
Food	$1200
Clothing	200
Church and charities	100
Music lessons for daughter	24
Lighting	60
Gas for cooking	48
Oil for heating	130
Doctors and Dentists	100
Telephone	30
Water bill	13
Miscellaneous items (Trips, books, magazines, papers, movies, etc.)	200
Total	$2105

To protect his family in case of his death he was carrying an Ordinary Life Insurance of $10,000, for which he paid a yearly premium of $201.40.

As he owned his home valued at $5000 he listed the amount of money needed for:

Taxes	$180
Insurance	25
Repairs and new furnishings	100
Total	$305

He spent over $100 to get to work as he traveled by train.

When Ray began to consider the matter of a car he found these items of expenses on the upkeep of a car:

Registration	$3.00
Licenses (wife & self)	4.00
Excise tax	3.16
Insurance, compulsory fire, theft	50.00
Running expenses:	
Gasoline	100.00
Oil	5.00
Greasing	6.00
Anti-freeze	5.00
Servicing and repairs	100.00
Total	$276.16

Assembling his data Ray was faced with this situation:

Salary	$3000
Expenses for family	$2105.00
Life Insurance	201.40
Amount to maintain house	305.00
Amount to maintain car	276.16
Total	$2787.56

$3000.00
—2787.56

$212.44

Ray and his wife have been able to save an average of $200 per year during the past ten years so have a Savings Bank account of over $2000.

Ray feels he can afford to purchase the Plymouth coupe for $920 as he can draw the money from his savings account. He will then not need to consider time payment plans.

Having worked out a functional problem unit, where practical business applications were necessary, Ray had a better understanding of the use of arithmetic as applied in everyday living. Ray worked on this problem one day each week for four months. Each item was gone into carefully and critically. Life insurance alone took the class time (and Ray's time) for about a month. And so for other items—Food, clothing, rent, car depreciation, etc., etc., exactly as in life.

A COMPLETE FILE OF "EDUCATION"

Ever since EDUCATION was first published in 1880, this oldest of the independent monthly educational magazines has been used by students of education in colleges and libraries throughout the United States and in many foreign countries.

Complete sets of EDUCATION are now scarce. We have just come into possession of such a set through the settlement of an estate. It is handsomely and substantially bound in full black grain leather and is in excellent condition. We would like to sell it to a library where it would be appreciated and used. If you are interested, write us for for further details.

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Why Don't We Teach The Metric System?

By GERTRUDE CUSHING YORKE
New York City

OCCASIONALLY an article appears in an educational magazine championing the so-called metric "system" and urging its compulsory use in the United States[1]. The writers, for the most part, are teachers whose integrity is unquestionable but who have not based their thinking upon objective data and the findings of research. In addition to this sincere but uninformed academic group unfortunately there are metric propagandists. Since the days of the failure of the French Revolutionists to conquor the world, metric propaganda has been at work to conquor the world for France intellectually by means of the compulsive use of metric units. Such metric propaganda, going on now for over a hundred and fifty years has differed in form and intensity somewhat with each new epoch and generation. In our own time we have seen it take the form, among others, of subversive activity during the years between World War I and World War II, when if the use of metric units could have been made compulsory, the waste and confusion which would have resulted in trade and industry would have tremendously delayed our war effort. Japan and Germany, both having compulsory metric usage, had a vast stake in attempting to divide the British Empire and the United States in this vital matter of uniformity of weights and measures. How it would have simplified our enemies' plans for world domination if they could have been assured of the compulsory use of metric units in the United States—if and when they occupied this country!

A misnomer which should be cleared up first is the term metric "system". The original metric system which was created by eminent French mathematicians and scientists in 1792, exists today only on paper. It is not used in its entirety even in France. Parts of it have been amputated while extensions and customary[2] units have been added. Thus the perfectly logical system which makes such an appeal to mathematicians has been mutilated almost beyond recognition until it is quite erroneous to speak of the metric system today, because the "system" has long since gone by the board and all that remains in use of the forty-five weights and measures of the original system are only a few isolated metric units[3].

Many people are intrigued and impressed by the metric myth of the

1 J. H. Fraden and P. M. Tully, "Mathematics and General Science Cooperate in Junior High School," "School Science and Mathematics," XXXX (June, 1940,) p. 541.

2 Customary weights and measures are those which through the centuries have survived on the basis of usage rather than fiat.

3 Kilogram (2.20 pounds), meter (1.09 yard), centimeter (0.39 inch), ton (2204.60 pounds), liter (0.91 dry quart or 1.06 liquid quart), kilometer (0.62 mile), cubic centimeter (0.06 cubic inch), gram (0.035 ounce).

"natural unit." Briefly the facts are that during the seventeenth and eighteenth centuries many scientists offered proposals for the improvement of weights and measures in France because of the lack of uniformity and corruption of the old system. In 1790 during the first months of the Revolution, Talleyrand, who was interested in unification, brought the matter to the attention of the National Assembly. All that was actually required was that some changes should be made in the Paris system, and that this revised system should be put into nation-wide use. As Napoleon later remarked, "It was so simple that it could have been done in twenty-four hours, and adopted throughout France in less than a year." The National Assembly, however, decreed that a study of the existing measures and weights should be made, and referred the demand for an improved system, based upon a "natural unit" to the Academie Royale des Sciences. This study was never completed or reported on, but the metric system was created. It was a direct by-product of the French Revolution and its back-to-nature philosophy based on Rousseau's "Social Contract." The doctrinaire theorists wished to "create them (the weights and measures) anew on invariable bases and to establish in commercial calculations the uniformity, which Reason has vainly called for, during so many centuries, and which must form a new bond between men."[4] Incidentally, such uniformity would be a valuable aid in the unification of the Republique, and one more bulwark for the centralization of power, a concern of paramount importance to those ruling at the time. So it was decided by "those builders of theories for an imaginary world," as Talleyrand characterized them — the mathematicians and other scientists, to whom the formation of a Republican system of measures and weights was entrusted, that the fundamental unit of the new system, the mètre, should be one ten-millionth of the distance from the pole to the equator on the terrestrial meridian which passes through Paris.

A report was made in 1792 giving the names, which had been carefully selected by a lexicographer, for all the measures, together with Greek and Latin derivations worked out to indicate the multiples and subdivisions on a decimal basis, but no values were given for the units. The report,[5] nevertheless, was adopted unanimously, and without debate. No one apparently stopped to consider whether or not this decimal system, so convenient for mathematical theorists, would be equally so for the great mass of tradesmen, who would actually have to use the weights and measures. In 1793 a provisional mètre (3 feet 11.442 lines) based on the 1740 survey was adopted, while the law of the 18 germinal in the year III (April 7, 1795) established the metric system.[6] The length of the mètre was changed in 1799 to 3 feet 11.296 lines, after the quadrant distance had been redetermined by measuring the distance between the cities of Dunkerque and Barcelone, situated on the Paris meridian, and calculating the quarter

4 Edward Nicholson, "Man and Measures," London: John Murray, 1912, p. 271 et seq.

5 Wilson read and reported on this document. See Guy M. Wilson, Mildred B. Stone and Charles C. Dalrymple, "Teaching the New Arithmetic," New York: McGraw-Hill Book Company, Inc., 1939, p. 259.

6 Pierre Chenevier, "Précis d'Arithmétique," Paris: Hachette' 1928, p. 204.

meridian.[7] This was found to be 5,130,740 toises.[8] The ten-millionth part of this length was adopted as the mètre.

Unfortunately, later measurements proved that the 1799 mètre was *not* one ten-millionth part of the meridian quadrant, and so in 1869 the French government had to define it empiracally as the length of a certain bar.[9] This action was taken at the recommendation of La Section Francaise of La Commission Internationale du Mètre, preceding the first meeting of the International Metric Commission which opened in Paris September 1, 1869. It was done to avoid embarrassment over new measurements by German, British and Russian scientists showing a new determination for the length of the mètre based upon one ten-millionth part of the meridian quadrant.[10] Thus the meter like our yard is an empirically defined measure and not a scientifically exact "natural unit."

Another misnomer which makes a great appeal to the academically-minded is that metric units are not used by the majority of the people in the United States and the British empire due to inertia. It is intellectual as well as physical laziness that keeps us from casting aside our customary weights and measures. Again let us consider the evidence. As early as 1817 John Quincy Adams "in conformity to a resolution of the Senate" made a scholarly and unbiased study of weights and measures to determine "what propositions relative to the uniformity of weights and measures should be adopted in the United States." After four years of study he recommended "that no present change in the weights and measures of the country be attempted," but that a more perfect uniformity of the weights and measures then in use throughout the United States be secured by suitable legislation. In his opinion the introduction of the metric system was not practicable.[11] In 1866 the use of metric units in the United States was made legal by an Act of Congress thus making their use permissive but not compulsory. Much literature in this field has been written since the famous Adams Report. A few typical studies are: Report Number 972 of the American Society of Mechanical Engineers; Research Report Number 42 and Special Report Number 34 of the National Industrial Conference Board; United States Hearings before a Subcommittee of the Senate Committee on Manufactures, 1922; and Hearings before the Committee on Coinage, Weights and Measures of the House of Representatives, 1926. Metric propaganda has been supported by "intellectuals" and opposed by manufacturers, business leaders and engineering societies not because of inertia but for very practical reasons which will be pointed out directly.

The writer recently made a comprehensive investigation[12] for the purpose

7 Pierre François André Méchain et Jean Baptiste Joseph Delambre, "Base du Système Métrique Décimal," Paris: Baudouin, 1810, Vol. III, pp. 592-650.

8 Toise=6 feet.

9 P. Camman and J. Huot, "Cours Elémentaire d'Arithmétique," Paris: J. De, Gigord, 1923, p. 225.

10 "Le Système Métrique Décimal," pp. 76 86. See also Guillaume Bigourdan, "Le Système Métrique des Poids et Mesures," Paris: Gauthier-Villiars, 1901, p. 255; and William Hallock and Herbert Wade, "Outlines of the Evolution of Weights and Measures and the Metric System," New York: The Macmillan Company, 1906, p. 69.

11 John Quincy Adams, "Report upon Weights and Measures," Philadelphia: Abraham Small. 1821, p. 81.

12 Gertrude Cushing Yorke, "A Study of Weights and Measures," "The Mathematic Teacher," XXXVII (March, 1944), pp. 125 128.

of discovering what has happened in countries which have made the use of metric weights and measures compulsory by law, imposing penalties for the use of customary weights and measures. First, a preliminary background study was made of the history of weights and measures and of the literature in the field of the problem. Second, a study was made of previous investigations pertinent to the problem. The data of the Halsey[13] questionnaire study in Brazil, Argentina and Uruguay and that of the Kennelly[14] field study in continental Europe were tabulated, analyzed and interpreted. The third part of the investigation was an original field study done by the writer in Brazil, Argentina, Uruguay and Paraguay, and treated in the same manner as the two studies mentioned above.

The evidence of the combined data indicates that the customary weights and measures which are used in trade and industry in the countries studied in continental Europe and in South America, where the use of metric units is compulsory, are those which are most convenient and so have become a part of the people's thinking. In all three studies the units which were mentioned most frequently were: the inch, the pound and the foot. In the South American data the arroba (25.35 pounds)[15] and the palmo (8.66 inches) ranked next in frequency. The data also indicate that after seventy-five years or more of compulsory metric usage, the per cent of customary usage in the four countries investigated in South America is approximately 35 per cent, while the per cent of metric usage is approximately 65 per cent. The Halsey data for South America (Brazil, Argentina and Uruguay) indicate a slightly higher percentage for customary usage (44%), and the Kennelly data for continental Europe indicate a slightly lower percentage for customary usage (28%). Probably, however, the actual usage of customary weights and measures exceeds these percentages.

The evidence of the data further indicates that the compulsory use of metric units in the countries studied has had other important effects. One of these is that it has created a mixed system. A second effect is that it has caused confusion in thinking. Third, it has necessitated much useless labor in calculating and making conversions. A fourth effect is the disregard and evasion of compulsory metric laws. A fifth effect is that it has caused a great amount of social and private cost: first to the governments for inspectors and enforcement; and second to business, industry, trade and commerce for calculating conversions and for machinery, equipped with both customary and metric gages and devices. Finally, it has made learning in the field of weights and measures more difficult for children in the schools, due to the fact that not a single system is in use as previously but a mixed system. and so conversions must be learned as well as many additional units.

One important implication of this investigation bears upon the question

13 Frederick A. Halsey, "The Metric Fallacy," New York: The American Institute of Weights and Measures, 1919. Fifty-two questionnaire replies were received from these three countries.

14 Arthur E. Kennelly, "Vestiges of Pre-Metric Weights and Measures Persisting in Metric-System Europe 1926-1927," New York: The Macmillan Company, 1928.

15 Spanish.

of whether or not metric usage should be made compulsory enforced by penalties in the United States. This study gave conclusive evidence that such compulsory legislation would be a great mistake because the use of twenty-eight metric weights and measures has been permissive for the past seventy-five years, and yet they have made no headway on merit. Second, the uniformity of the English system would be lost, and a mixed system would result, causing confusion and useless expense, such as have been experienced in Europe and South America. Furthermore, because the United States is a highly industrialized country, the confusion and expense of a forced change to metric units would be much greater than in South America, which was little developed industrially when the change was attempted there in 1862.

Another implication bears upon the educational question of teaching the metric system in the schools of the United States. The evidence beyond any doubt makes clear that it should not be taught as a basic system, which will ultimately replace our present one, first because the metric system as such exists only on paper. Actually in use there are a few isolated units, together with their halves and quarters. Second, the twenty-eight metric weights and measures, which were legalized in the United States in 1866, are used scarcely at all except in laboratory work, where the gram and cubic centimeter are convenient. For such specialized work these particular units should be taught when needed. Third, the advantages claimed for metric weights and measures are pure academic theory. In practice they have more disadvantages than advantages. Fourth, a nation's weights and measures like its language cannot be taken away and replaced overnight.

For the above and for many other good and sufficient reasons[16] too numerous to mention in this article we do not and should not do any systematic teaching of the metric "system" in the schools of the United States.

16 Gertrude Cushing Yorke, "Some Effects of the Compulsory Use of Metric Weights and Measures," Boston University, 1942. This unpublished doctorate dissertation may be consulted in the School of Education Library.

Appreciation Unit *in* Measures

The Story of Paper Bags

By FLORENCE E. COBB

Hunnewell School, Wellesley, Mass.

AN ordinary paper grocery bag may not appear to most persons to be an interesting object in any sense of the word, but to a fourth grade class in the Hunnewell School in Wellesley, it grew to be the center of a great deal of interest.

The class was studying measures. The children had named many things and discussed how they were measured. Sizes as well as units of measure had been discovered. Then someone brought in a paper bag and named potatoes as being measured in a paper bag. Another child questioned it, declaring the potatoes were put in the bag after they had been measured. The first child tried to prove that the bag was a measure, the class took sides, and we were off on an extensive study of paper bags.

Dozens of bags were brought from home and studied carefully. The children discovered that every bag has numbers on it, top and bottom. Some bags have other things on them. Questions were asked by the children. These were put on a big chart where all could see them, then the interest mounted high as we set about finding the answers to the questions.

Next the children listed things they had observed about paper bags and they made a few guesses as to the meaning of some of the words and numbers which they had observed.

The next step was to get from a reliable source the information the children desired. But where would one go to get such information? Some children suggested talking with the men in the grocery stores while others suggested writing to companies that make paper bags. We carried out both of these suggestions. The response from paper bag companies was far beyond our expectations. Not only were ninety percent of our letters answered but more than fifty percent of these gave us very complete and definite answers. Some companies sent us illustrative material and sample paper bags.

One of the outstanding things about the letter writing phase of our unit was that everyone answering the children's letters realized that a child was asking for the information and wrote the reply in phraseology that the child could understand.

We started off with the addresses of two paper bags companies. One child discovered that he could find more addresses in the business section of the telephone book. In all we wrote to fifteen companies. In addition to these we wrote to the Bureau of Standards at Washington, D. C., from which we had a most interesting letter and a booklet entitles "Paper Grocers' Bags."

The letters we received and the printed material sent us answered all of our questions; but the class was not

satisfied to stop there. They had raised many more questions.

First of all, they learned that paper grocery bags have standard sizes and that the number at the top of the bag tells how many pounds the bag will hold. The symbol SS on the bag means that it is a standard size according to the Bureau of Standards at Washington, D. C. Grocers' bags are made in about nineteen sizes ranging from one-quarter pound size to thirty-five pound size. There are four main types of bags—the flat bag, the square bag, the satchel bottom bag, and the automatic bag. There are two sets of numbers on a bag. One is a code number and the person who knows the code can tell on which machine the bag was made and who the operator was. The other number is the date on which the bag was made. 2 B 5 would mean that a bag was made during the second week of February, 1945; the 2 being the second week of the month, the B the second month of the year, and the 5 meaning 1945.

It was discovered that one bag company has what they call their animal line, the bags having such names as tiger, elephant, lion and zebra, the elephant bag being an especially heavy bag and the zebra having a striped color effect on the outside of the bag.

A great deal was learned about the making of paper bags beginning with the kind of tree grown for this purpose. One company sent us a large picture of a paper bag machine. These are only some of the bits of information gained from "The Story Of Paper Bags." Many more could be listed.

At the end of the unit, the children arranged an exhibition. In the exhibition were the letters we had received containing the information, many pictures and illustrated folders, a large exhibit of paper bags from the various companies arranged by them according to sizes and having captions explaining them.

To organize their own learnings, the children made a large book 24x36 in which they wrote the information they had gathered. As a final assignment, each child made a standard size bag from kraft paper measuring very carefully to get the right dimensions, then designing a trade mark using his own name as that of the company who made the bag, and finally putting his code number and the date numbers in their proper places. Some children chose a brand name and lettered it under the trade name emblem.

"The Story of Paper Bags" became very popular. We told the story many times to visitors who came to our room to see our exhibit and hear our story.

The children's biggest thrill came the day that Dr. Wilson came out from Boston University to hear our story of paper bags. He made a recording of the story as we told it, for use with a university class.

Five members of the class took part of the exhibit in to Boston University, set it up, and told the story once again in the form of a quiz program.

What did the children gain from all this? First of all they gained a real understanding of measures, and not once during the whole unit was anything said about memorizing a table of measures. Every child had learned to measure with his ruler with a degree of accuracy greater than that of most adults. They learned to

change inches to feet and feet to inches easily and quickly. They learned much about the pound.

"Story of Paper Bags" was followed by "The Story of Buttons." This proved to be just as interesting and valuable an appreciation unit in measures as the one on paper bags. A unit of this type has great possibilities. It affords an interesting approach to a field of mathematics which has a great history. It leads easily to the study of specific measures. It can proceed on a voluntary basis. It is self motivating. The one requirement for success is good teaching; the teacher must use the appreciation technique, not drill. Children at the fourth grade level can begin to see that measures serve a useful purpose in trade and industry, and that any measure used is the one that is most appropriate for the commodity being measured.

VETERANS

Every major war in which the United States has engaged has left behind it a "veteran problem" that had to be faced sooner or later, BUILDING AMERICA's current unit, "Veterans," points out, and 15,000,000 veterans will probably emerge from our armed forces of World War II — more than double the number that fought in all our previous wars put together. The unit which is issued by the DEPARTMENT OF SUPERVISION AND CURRICULUM DEVELOPMENT of the NATIONAL EDUCATION ASSOCIATION, 2 West 45th Street, New York 19, N. Y., asks, "Will America be ready to give them their chance to find the best possible road back to civilian life?"

Illustrated with many action photographs and several excellent pictographs, the unit traces the story of the demobilized soldiers of the Revolutionary War, the Civil War, and World War I, and the government provisions whereby the nation felt it had discharged its duty toward them until suddenly confronted with the results of its neglect.

The unit makes clear that there is already ample evidence that this time a more enlightened program will do much to insure against the failures after other wars. After briefly describing the home front to which the soldier will return after the war, and some of the things he goes through as trainee and fighting man, the unit describes the tremendous machinery now operating to provide veterans with health, job and educational opportunities and relief from hardship. In a concluding section the unit points out that government help is not enough, however; a climate of understanding warm and helpful to the veteran in finding the road back to civilian life is vital to insure against ultimate failure.

Analysis *of* Written Problems *in a* Recent Arithmetic Series

By CLARA E. DEXTER

Edward Morley School, West Hartford, Conn.

SOME of the elementary school subjects have been entirely reworked. Two outstanding examples are reading and the social studies. A glance through any of the new basic readers shows how they have utilized situations that are real, vital and meaningful for the child. In teaching the social studies the teacher no longer uses one book, rather she develops a social understanding through actual experiences. In the tool subjects of reading, spelling, writing, and arithmetic, limited basic skills should be developed and beyond that, the child should rely on reference usage and application of these skills in useful situations and experiences. The purpose of arithmetic is to develop the ability of the pupil to think quantitatively in the situations which he meets. Arithmetic can no longer be considered as merely a given set of facts and skills; situations which are used to develop quantitative thinking must grow out of actual experiences.

The main difficulty in arithmetic has been that teachers were entirely dependent upon the text, and it is still too commonly the practice to assign a given number of problems to be worked in a half or three-quarters of an hour. Authors are trying to improve texts by offering problems within children's understanding, but they appear to forget that it is real experience and actual need that are required. The social utility viewpoint has definitely gained ground in arithmetic and many recent texts have honestly been striving in this direction as shown by titles such as the following: *Child-Life Arithmetics, Mathematics and Life, Daily Life Arithmetic.* This analysis of the Clifford Woody, Frederick S. Breed, James R. Overman series of *Child-Life Arithmetics* for grades three, four, five and six, is made with the purpose of finding out what is actually between the covers, seeing if it meets the promises of its introduction, and comparing the problem work in these books with that of the old textbooks as well as with the newer functional problems. For this thesis[1] a problem was defined as a situation encountered by the child which he wishes to solve.

Criteria[2] were set up, and in the light of these each written problem in this series was examined and classified under the following six headings.

1. *Sample* This is a type of problem which is solved for the pupil and is placed in the book as a guide for doing other problems of the same type.

2. *Mere Exercise* This is a type of problem which employs none of the

1 Clara E. Dexter, "Analysis of Written Problems in a Recent Arithmetic Series," Masters' Thesis, Boston University, 1943.

2 Guy M. Wilson, "Criteria of the Written Problem in Arithmetic," "Education" 59: 459 (April 1934.)

fundamental processes. As a rule it requires only the reading or writing of numbers.

3. *Fact Question* This is a type of problem which requires the pupil to apply tables of measures previously learned.

4. *Purely Artificial* This is a type of problem which requires the pupil to do figuring on a situation which is not of interest to him in his locality, which is beyond his understanding, and which is pointless. It is apt to be the exception when encountered in real life. Many times it is necessary to place problems under this heading because they are such as to require the pupil to solve them in a manner not normally used in real life.

5. *Possible but Improbable* This is a type of problem which requires the child to figure on a situation which might be within his understanding and which he could encounter in real life in certain communities. To make these problems into real situations would require changing the figures to agree with those of the locality or situation involved, such as the actual cost of articles. Also, the problem would have to occur in connection with a worthwhile functional problem unit.

6. *Real Situation* This is a type of problem which requires the pupil actually to do something within his scope of comprehension and has as its motivating force pupil interest.

The following table shows the frequency of these six types of problems as they occur in the four books analyzed.

How do the problems of this series classify themselves when carefully and critically scrutinized?

One-eighth of all the problems are sample problems, that is problems with the complete solution given. This in itself would not be bad, but in a great many of these, the solution is given in a purely artificial way by a process that the pupil would not encounter in real life. Generally one thinks of a sample problem as a guide for the solution of following problems of a similiar type. In these texts the sample problems are generally followed by drill examples, thus mixing problems and drill, using the problems purely for drill, not for further problem work. This tends to make all problem work artificial.

The fact questions and mere exer-

TABLE I

Showing The Total Frequency In Books 3, 4, 5, 6, Of Types of Problems As Explained On Page 14

	Frequency in Book				*Total*
Type Of Problem	*Three*	*Four*	*Five*	*Six*	*Frequency*
Sample	74	39	122	73	308
Fact Question	41	25	40	68	174
Mere Exercise	94	72	81	57	304
Purely Artificial	81	125	258	185	649
Possible (Improbable)	282	236	192	264	974
Real Situation	6	1	0	0	7
Total Number of Problems	578	498	693	647	2416

cises carry little weight on either side of this discussion, as the former involve simple putting down in part or whole rules learned, and the latter require no arithmetical computations. Both types merely promote drill.

Table I shows that twenty-seven percent of the problems classified here as purely artificial, are pointless, and put in the book purely to provide an opportunity for certain figuring. The real aim of problem work in arithmetic is to prepare children for adult life by developing "business judgment" and this means for each grade, the careful planning of a few appropriate units that can be profitably developed on the basis of commonity and personal experience. When the child is asked to solve more than one-fourth of the problems (649) in a way not encountered in real life, he certainly is not being trained to use good "business judgment."

Problem situations which under certain circumstances might occur in worthwhile problem units were classified as possible, whereas as they stand they are purely artificial and improbable. Some of the problems which fall under this classification may be turned into real situations if handled correctly by a skillful teacher. In the textbook approach to real problems, the teacher selects problems from her text-book which involve situations that are adaptable to worthwhile problem units suited to her class and locality. She develops a few of them into real units. Some of these units will take a week or more to develop. Never should four or five per day be assigned.

Table I also shows a decided lack of real situations in this series varying from six (setting up and playing a game) in Book 3, one (keeping a weather record) in Book 4, to none in Books 5 and 6. Out of a total of 2,416 problems in the four books analyzed, only seven or .29 of 1% are real situations, that is, problems which require the child actually to carry out some activity. Thus, one of the criteria of problems, namely, "experiences which are used to develop quantitative thinking must be associated with actual situations"[3] is not carried out. The data presented in this table showing a decrease in the higher grades rather than an increase, indicate that this series fails to carry out the true aims of problem work in arithmetic.

Enough has been done with functional problems in arithmetic in recent years to suggest strongly the entire abandonment of the isolated textbook problem and its replacement by large functional problem units.

3 Lee and Lee, "The Child and His Curriculum." D. Appleton Century Co. 1940, p. 415.

The Arithmetic *for* Which I Have No Use In *a* War Plant

By CAROL CONKLIN
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THE teaching of the basic, practical and informational fundamentals of arithmetic in the elementary schools of America forms one of the most interesting and, perhaps, one of the most neglected chapters in the American industrial history.

It is distressing to note that a great majority of the workers and new trainees in war work, some with more than high school education, are bewildered at simple problems in arithmetic. This is definitely attributed to the teaching of too much of the traditional, and too little of the vital, essential, and useful phases of arithmetic.

Some adults who have not had to use arithmetic since school days, are now faced with the necessity of knowing how to use mathematics in daily tasks. War-time demands make it essential that they practice it. They are confused with the simple task of figuring the weekly pay check.

There are people possessed with considerable native ability, which they have demonstrated in skillful handling of tasks assigned to them, who hesitate to apply for more imporant jobs because they have a lively doubt of their knowledge and understanding of simple figures.

If these people knew the simple fundamentals of arithmetic perfectly, they would be confident and secure, where now they are in confusion, and they would look forward to more difficult tasks with entire confidence. The average adult is frightened at anything involving arithmetic, even the most simple in form.

From operator to foreman, it will be found that one must be accurate at all times, when dealing with pay checks, cut-offs, standards, scrap, or inventory. Yet, any one of these involves only basic arithmetic, such as addition, substraction, multiplication, division, and simple fractions.

The chief use of arithmetic by workers is in connection with the weekly pay check. For new workers, or those on an hourly wage basis, such figuring is illustrated in the following:

A. My base pay is 50c an hour I work 7½ hours a day. What do I earn?

$.50 X 7½=$3.75

B. Lunch is considered down time. It takes ½ hour; the pay is 50c an hour. That adds 25c to my pay check.

$3.75 + $.25=$4.00

C. Time beyond 40 hours per week is overtime, and is figured at time and one-half. I work 8 hours extra.

8 X $.75=$6.00

D. I work 5 days at $4.00 a day.

I work 8 hours at time and one-half. What is my weekly pay?

$20.00 + $6.00=$26.00 Total

The above illustrates the simplest figuring encountered in a factory. It is so simple that if workers were secure on addition, multiplication, and easy fractions, it would cause no concern. But the majority are not secure on the simplest of simple fundamentals. They count instead of adding. They say tables to get multiplication answers. Even after they fully understand what to do and what processes to use, they still stumble.

If wages are on any basis other than a straight hourly basis, such as so much per 100, the worker easily understands the plan, but is likely to get bothered on his figuring.

For example, if a team produces 59 per hour for 7½ hours, the production is 442.

If now this production is paid for at the rate of $2.28 per 100, the return will be $2.28 x 4.42=$10.08.

The above will not confront an operator before he has had six or eight weeks in a factory, and, therefore, plenty of time to understand it. Any attempt in the grades to anticipate this figuring would be time wasted. The job alone will give it meaning.

If the figuring itself does not bother, there is no difficulty. What is needed is confidence in ability to do simple figuring, and this job the schools should be able to do.

On the other hand, if the schools attempt to anticipate all of the possible jobs by putting before children all kinds of job situations which they do not understand, the result can only be confusion worse confused. Every problem taken should be based on experience; thus, when these pupils later meet experience that calls for figuring, such as figuring a pay check, they will know how to think and how to apply proper processes. And for this work their mastery of the fundamentals should be perfect.

The above discussion is intended to make it clear that only simple arithmetic is needed in war plants. There is no use at the employee level for any algebra, ratio, square root, mensuration, logarithms, nor for any fractions except the simplest. Any decimals will be money.

There may be exceptions among those who serve as engineers, statisticians, draftsmen, and electricians, but even for these positions, the basic need is the same as for the operator. Without clear concepts and ability in the fundamentals, their slide rules and tables will serve little purpose.

Judging by the need for arithmetic in a typical war plant the majority of people need only the simple fundamentals of plain arithmetic, but this should be mastered thoroughly. Any mathematics beyond this which is needed by the specialists, should be taught when the time presents itself on the job, or in special courses taken before the job is taken over; this special mathematics will vary greatly for particular occupations.

If arithmetic is taught beyond the fundamentals, which must be mastered, it should be taught for purposes other than mastery. Such work would come not as drill but as enjoyable appreciation units or informational problems. It is the drill attitude toward everything in arithmetic, useful and never-used alike, that makes arithmetic into a deadening grind. This is unnecessary. Master the essential; let those who choose enjoy the rest.

Teaching *the* New Arithmetic *in a* Third Grade

By BERNICE McCANN
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Functional Arithmetic requires 100% results in the useful fundamentals. The four fundamental processes make up over 90% of adult figuring.—The Editor.

THIS study is developed around the findings in a class of third grade children in the Washington Elementary School, Lowell, Massachusetts. The methods used were based on the Wilson, Stone, and Dalrymple system as outlined in "Teaching the New Arithmetic." The supervising teacher and the apprentices assigned to the room were trained in the Lowell State Teachers College, Lowell, Massachusetts. The children were about average in ability.

The training these children had received in grades one and two consisted of the development of number concepts through counting, reading numbers, writing numbers, measuring, telling time, United States money, and games. Most of the work was developed around games which were played for the game itself and to give meaning and use of numbers. Number learning was incidental and what little drill that took place was developed around the numbers used in the games. The main aims were to give the child opportunities to read, write, and add numbers under conditions in which he could understand the meaning and use of numbers and their application to different number situations on his level.

Children in the first and second grades can successfully do some drill work but there is no profit in it. There is not yet a readiness for combinations like $9 + 7$ and $27 \div 4$. Here automatic responses mean little or nothing to the child. The meaning theory through experience is generally accepted by students who have developed a reasonable modern viewpoint. First and second grade children show a readiness for number concepts and relationships when the work is presented through experience units and is on their social and mental level.

In the Washington school we developed without difficulty in a little more than the first half of the third school year the 100 primary addition facts, the 300 upper-decade addition facts, and the 80 addition facts needed for carrying in multiplication up to 9×9 that involve adding beyond $39 + 9$. The teaching load for the latter part of the school year was the

100 primary subtraction facts and the 175 even subtraction facts needed for short division with divisors from two through nine. The total teaching load for the year was 755 facts which were drilled on for automatic responses, following adequate development of meaning and motivation.

The tests were mimeographed and given about the first of June 1944. The 300 upper-decade addition facts were divided into four different tests. The 175 subtraction facts were divided in two separate tests. There was one test each for the 100 primary addition facts and the 100 primary subtraction facts.

The time involved in completing the tests was not emphasized by the instructor and the children were allowed to work at their own rates. To them it was just another test with combinations that had been systematically presented to them and drilled upon many times. This feeling of confidence and the speed shown in the tests had been gradually built up doing the year as a result of (1) step by step approaches to the work, (2) the elimnation of counting and guessing, (3) the pleasant fixing of automatic responses due to the use of games and flash cards.

The plan for mastery must be complete and systematic, and it must cover all of the primary and decade facts. The teacher must know the facts to be taught and the relationships between the primary and decade facts. Progressive arithmetic not only demands a plan of teaching but calls for constant reviews and inventory tests. The brief statement which follows regarding the teaching of addition applies to the teaching of all the fundamentals of arithmetic. It begins in grade three following development of meaning and motivation.

The initial step is to place group one which consists of ten combinations on the blackboard and drill on these facts until all of the children give the correct answer. This is followed by teaching the ten process steps and the related forms. All identies are placed on cards and posted in the back of the room. Children are taught to look at these cards for the answers they do not know. Different colored cards are used for different groups of combinations. Primary facts appear in a vertical form and decade facts in a horizontal form.

A score is kept of each child's errors for both the drill and game program. These errors become part of the drill load for those children who make the errors. The rapid drill stresses speed and accuracy; but if a child makes an error, or did not know the answer, he was told the correct response immediately without any feeling of embarrassment or pressure. The children soon saw the relationships between the flash cards and the games and realized that the flash cards aided them in keeping their scores as well as teaching them new combinations. The teacher does not need extra time for this program.

Perfect scores were not obtained by all the children on the tests but the scores are remarkable compared with records a few years ago. Perfect scores were generally obtained by all the children after each unit of work had been completed. It is not assumed that these children will enter the fourth grade in the fall and score as high on the tests as they did in the spring. The fourth grade teachers job in the fall is to review and re-

TABLE 1

The Results of Teaching Addition in A Third Grade At The Washington School, Lowell, Massachusetts

	Number of pupils in each test	Average time in minutes for each test	Number of different examples in each test	Largest number of errors made by one pupil	Total number of examples solved (Test examples X pupils)	Total number of errors found in all the tests	Percentage of the total number of examples solved correctly
1	2	3	4	5	6	7	8
100 primary addition facts	19	4.7	100	3	1900	22	98.85
300 decade addition facts divided into four tests							
Test 1	18	8.5	70	6	1260	39	96.91
Test 2	18	10.6	87	6	1566	46	97.07
Test 3	18	10.1	90	6	1620	52	95.88
Test 4	18	4.4	53	3	954	16	98.33
80 decade addition facts needed for carrying in multiplication	18		80	8	1440	35	97.57

TABLE 2

The Results of Teaching Subtraction in A Third Grade At The Washington School, Lowell, Massachusetts

	Number of pupils in each test	Average time in minutes for each test	Number of different examples in each test	Largest number of errors made by one pupil	Total number of examples solved	Total number of errors found in all the tests	Percentage of the total number of problems solved correctly
1	2	3	4	5	6	7	8
100 primary subtraction facts	18	12.4	100	16	1800	62	96.56
175 subtraction facts needed for subtraction in short division							
Test 1	18	11	100	25	1800	77	95.73
Test 2	18	9.2	75	32	1350	66	95.12

teach these facts, but the initial learning will make the relearning process relatively simple for the teacher and children.

Tables one and two are self-explanatory.

Other data indicate that more time was used in developing addition, and that the scores in subtraction are not so good as in addition. In addition a large percentage of the children did not miss more than three facts or combinations while in subtraction the spread was greater. In both addition and subtraction, the results are excellent for a third grade. The very few cases where there were a large number of errors was due to continued absence or inability to do good work in school. For these children their work in arithmetic was better than in their other school subjects.

A result not shown in the tables of this study is the changed attitude toward arithmetic developed in the first, second, and third grades in the Washington school. In arithmetic, these children have a feeling of enjoyment, of confidence and success; this in a subject that is often disliked by the children and furnishes a large percentage of school failures. Statistics show that traditional arithmetic is a program of confusion and defeat. Children soon learn to dislike it. Ask the average business man who employes these children, what he thinks of arithmetic in our schools. The answer to the question is obvious and can be supported by sufficient data to show that the elimination of traditional processes, the elimination of systematic drill in the first and second grades, and a teaching plan with complete coverage of the fundamentals will produce as good results in the average third grades as are found in this study.

Capitalizing Children's Experiences *in* Arithmetic

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YOUNG teachers and perhaps others inexperienced in capitalizing children's experiences in arithmetic are often so busy collecting money, checking supplies, passing out bottles of milk and performing many other routine tasks that they search dazedly for functional arithmetic units unable to see the forest for the trees. In order to help these teachers we must recognize three of the major difficulties facing them. (1) Their first need is to *inventory the opportunities* at hand and then to see how others have made use of the potential outcomes offered. (2) Later they will be ready to analyze the experiences suited to their classes to determine how *child growth* may result from continued use of these activities. Growth in judgment, in use of subject matter, and in child responsibility will result from the use of a planned procedure not by doing the same thing in the same way every day or week in the year. (3) The young teacher also needs to know how to get a maximum of *child participation* with the most *economical use of time.* Many experience programs break down or become relatively ineffective because of neglect of the two last points. However, it is the purpose of this article to give help on the first of these problem viz., noting experiences and reports of their use.

Advocates of the use of the functional problem solving units are not asking that situations be set up to create a need for arithmetic but only that those experiences which are a natural part of a soundly progressive program be utilized. That is to say, checking of attendance, measuring and weighing children, selling War Savings Stamps, holding a party, giving to Junior Red Cross, taking an excursion etc., activities which take place in every school, are not in the program because of their potential arithmetic outcomes. They may in fact be completely ignored by the teacher who has the children solve textbook problems during the arithmetic period and then sits down alone after school to plan a Christmas party for the class. Or on the other hand, these experiences may be made the means whereby children develop number concepts, form judgments based upon information gathered or computation performed, gain insight into the social situations giving rise to the arithmetic, see a need for learning new facts and process steps and put into use the materials on which they have been drilled.

Let us sit down with the teacher who is planning for the year her tentative program in arithmetic. We first note the regular activities of her classroom which will continue *daily* or *weekly* through the year viz., the recording of attendance; the purchas-

ing of milk,[1] cookies,[2] War Savings Stamps,[3] hot lunches; the handling of supplies,[4] and the collection of dancing class money. Plans must be made for the best use of buying activities whether the purchases are carried on entirely within the class room or are made at the milk bar, cookie counter or stamp booth. When mentioning cookies it might be well to point out that planning the sale of fruit or of fruit juices and crackers, more acceptable from the viewpoint of health, would be a worthwhile functional unit. School banking,[5] discontinued generally in favor of War Stamps, will be resumed after the war and can be made the basis of much practical arithmetic.

Let us next examine the *occasional* activities which may be expected to occur during the year. Children must be measured and weighed[6] and must be given eye tests. We learn of a group of fifth grade children who found that they needed to add mentally to 50 pounds (the weight for which the scales were set) an additional 17, 20, etc. pounds read from the bar. Questions of comparative weight led to a discussion of height and body structure. We read of a third grade class who showed surprising variation in their estimates of the twenty foot distance needed in placing the eye chart.[7]

During Book Week attention may be directed to the reading center,[8] the room or school library,[9] or the purchase of books.[10] We discover an enterprising fifth grade which purchased booklets,[11] (which to record titles of books read during the year) at a cost of $.01½ each selling them for $.02.

Participation in Junior Red Cross activities include collection of money for room memberships, filling Christmas boxes, and preparing individual kits for children in war torn Europe. Contributions to the Community Fund and to the "March of Dimes," receipts from the sale of school photographs and of garden seeds likewise involve the handling of money. In the spring will come plans for the school or home garden[12] and, toward the end of the school year, quite probably a class picnic.

In addition to the school services already indicated we find teachers reporting the serving of a teachers' luncheon,[13] a luncheon for the first grade,[14] refreshments for conference visitors,[15] as well as making a school room more attractive,[16] publishing the school paper,[17] and selling pop at an Open House conducted by the school.[18]

One group made a map[19] of their part of town to show homes from which children in their school come and included industries and points of general interest. Others found that planning how to use a club, class, or school fund[20] provided opportunity for judgment.

A helpful type of service was rendered by a class which prepared for use by others a booklet[21] containing distances, sizes and weights for purposes of camparison and information.

A fifth grade, learning to use time tables, through their Travel Bureau wrote letters to conference speakers giving accurate and confidently expressed information about trains, buses, etc. These children were quite impressed with the expense of taxi service from the station to the school at fifty cents in contrast to a five cent bus fare. Plans for a class[22] or Mother's[23] party or for birthday[24] and

seasonal celebrations such as Hallowe'en,[25] Valentine Day,[27] Easter, May Day, etc., involve selection, purchase, and preparation of food for refreshments; timing the program; scoring games; writing invitations and possibly making costumes.

Christmas activities include the making of gifts for other classes[27] or for members of the family.[28] While these are likely to be Art or Nature projects the quantity and cost of materials must be considered. The children's own shopping provides a splendid opportunity for constructive consumer education. Let us list with the children gifts which they think are suitable for mothers and others and through the use of newspaper advertisements and of visits to stores find places and prices at which these gifts may be bought. A timely activity in the early weeks of school this year was the filling and mailing of an overseas Christmas box for a service man.

Decorations for the class room and the assembly are further experiences with arithmetic outcomes. Preparation for its graduation led a sixth grade class to make its own moving picture,[29] a delightful venture into fields other than arithmetic.

Consumer Education has been called a "must"[30] for elementary schools. Many teachers, possibly unaware that they were fostering consumer education, have nevertheless been developing with the children units such as "Daddy's Carfare,"[31] "Cost of Two or Three Week's Stay at Summer Camp,"[32] "Fourth National Store,"[33] "Cost of My Education,"[34] "Cost of Raising 250 Chickens,"[35] "The Budget,"[36] "What I Cost My Parents,"[37] "Cost of Screening a Porch,"[38] "Planning a Wardrobe for Entering Junior High School,"[39] "Making tooth powder, furniture polish, ink, hand lotion, and paste."[40] A sixth grade having acquired a new globe became much interested in its cost and subsequently in the cost of other materials and equipment[41] in the room.

Children as well as adults are taking an active part in the *life of the community.* Collecting waste paper[42] making favors for hospital trays, putting together a quilt for a children's hospital,[43] packing a basket for a needy family,[44] serving a community supper[45] and studying modern[46] homes are some of the experiences which have been reported. The cost of gifts and services is often defrayed through proceeds from sales. Articles sold have included Easter eggs,[47] candy,[48] glaced apples,[49] ice cream,[50] peanuts[51] and bulbs. A third grade repaired and sold toys[52] just before Christmas using their proceeds for the purchase of a subscription to Readers Digest for a nearby army unit. Another school purchased with the proceeds from a Christmas sale,[53] games for a veterans hospital, toys and games for a babies hospital and the children's ward of the general hospital.

In one city, "Fifth graders have made a map[54] showing the location of street lights, have counted the number of broken light globes and bulbs, have checked to learn what replacements cost and have presented the findings at a school assembly where they have asked what ought to be done about the situation."

Some teachers are quite alert to the possibilities in *current happenings.* And so we find reports of "Byrd's Snow Cruiser Goes Through Springfield,"[55] "Arithmetic in the 1940 Cen-

sus,"[56] and "A Trip to the World's Fair."[57] It is to be greatly hoped that teachers took advantage of the need in rationing fuel oil for finding areas. The post war construction of local airports will provide an interesting experience for teachers and classes alike.

No attempt can be made here to indicate the numerous arithmetic outcomes resulting from units centered in social studies, health, science or other subject matter. The excursion, exhibit, or unit relating to travel, transportation, aviation etc. will be rich in arithmetic outcomes involving both judgment and computation.

Let us hope that our growing teacher will be encouraged from the suggestions noted to read reports of units, making use of the bibliography which follows. She may wish to select experiences which others have tried and adapt them to the needs of her class. We hope she will go on to develop new experiences with her classes and will wish to have these published or duplicated to share with other learners. By the way what are you doing that should be shared?

1. a. Welch, L. Gertrude: "A Fifth Grade Informal Problem Unit in Arithmetic on the Ordering and Distributing of Milk in the School," Education 61: 458-463, April, 1941.

b. Harap, Henry: "Eight Activity Units in Decimals," Curriculum Laboratory, George Peabody College, Nashville, Tennessee, Grade 6.

2. a. Shibles, Mark R.: "How to Capitalize Children's Experiences in Arithmetic," Belmont School Department, Belmont, Massachusetts.

*b. Driscoll, Adele: "Daily Cookie Sales," Former Supervisor Grade Six, Horace Mann Training School, State Teachers College, Salem, Massachusetts.

*3. Lindquist, Evelyn: "Selling United States War Savings Stamps," Principal Training School, State Teachers College, Bridgewater, Massachusetts.

*4. a. Borchers, Louise H.: "Taking Charge of the General Supplies of the School," Supervisor Grade Five, Training School, State Teachers College, Bridgewater, Massachusetts.

b. Gavian, Ruth Wood: "Helping Children Grow in Economic Competence," Childhood Education 20: 205-211, January, 1944.

5. a. Harap, Henry: "Eight Activity Units in Decimals."

*b. Lindquist, Evelyn: "The Children's Bank."

*c. Lindquist, Evelyn: "Planning and Building a Bank Booth."

6. State Department of Education, Tallahassee, Florida: "Arithmetic in the Elementary School," Bulletin No. 26, September 1942, p. 96-98.

*7. Wade, Louise: "A Problem in Measurement," Supervisor Grade Three, Training School, State Teachers College, Westfield, Massachusetts.

8. State Department of Education, Tallahassee, Florida: "Arithmetic in the Elementary School," p. 70, 72, 74, 78.

9. a. Green, Ethel M.: "Three Objectives in Arithmetic," Childhood Education 5:455-460, May, 1929.

*b. Burke, Helen E.: "A Library Unit," Grade Five, Prospect School, Beverly, Massachusetts.

10. Wilson, Mary: "Pupil Growth Through Number Experiences," Childhood Education 15: 219-223, January, 1939.

*11. Yeomans, Rosanna: "A Book Week Enterprise," Former Principal Paul Revere School, Revere, Massachusetts.

12. a. Harap, Henry: "Eight Activity Units in Decimals."

*b. Perham, Mary V.: "The School Garden," Supervisor Grade Five Horace Mann Training School, State Teachers College, Salem, Massachusetts.

c. State Department of Education, Tallahassee, Florida: "Arithmetic in the Elementary School," p. 90-95.

13. Harap, Henry: "Six Activity Units in Fractions," Curriculum Laboratory, George Peabody College, Nashville, Tennessee.

14. Harap, Henry: "Six Activity Units in Fractions."

*15. "Serving Refreshments for Conference Visitors," has been reported by Clara Leyonborg Kirby, Anna F. Deane and Louise Wade, Supervisors of Grades One, Two and Three respectively of the Training School of the State Teachers College at Westfield, Massachusetts, and by Sybil Tucker, Mary V. Perham, and Adele Driscoll, Supervisors of Grades One, Five and Six of the Horace Mann Training School of the State College at Salem, Massachusetts.

16. Robinson, Elizabeth W.: "Diary of a Lunchroom Project," Childhood Education 18: 321-323, March, 1942.

17. Lane, Deneige M. D.: "Arithmetic in a School Activity," Education 61: 464-467, April, 1941.

18. Thewlis Beth, Rowntree, Robert, and Prott, Mrs. Joseph: "Open House and a Good Time by All," Childhood Education 17: 128-130, November, 1941.

19. Mackintosh, Helen K.: "What Do We Mean by An Adequate Elementary School Program?": Childhood Education 17: 154-157, December, 1941.

20. Gavian, Ruth Wood: "Helping Children Grow in Economic Competence," Childhood Education 20: 205-211, January, 1944.

*21. Simons, Ruth K.: "Measurement Activities," Teaching Principal Centerville School, Beverly, Massachusetts.

*22. Deane Anna F.: "Shopping for a Party."

23. Harap, Henry: "Six Activity Units in Fractions."

24. Walters, L. Helen: "What the Children Are Doing—We Celebrate Birthdays," Childhood Education 17: 311-317, March, 1941.

25. State Department of Education, Tallahassee, Florida: "Arithmetic in the Elementary School," p. 72.

*26. Tisdale, Miriam W.: "A Valentine Party," Centerville School, Beverly, Massachusetts, Grades One and Two.

27. a. Reed, Edna M.: "A School Shares Christmas Gifts," Teachers Lesson Unit Series No. 84, Teachers College, Columbia.

b. Simpson, Mary and Spurgeon, Sarah: "Growing Through Christmas Giving," Childhood Education 17: 173-178, December, 1941.

28. Harap, Henry: "Eight Activity Units in Decimals."

*29. Lindquist, Evelyn: "Earning Money for a Moving Picture of Ourselves."

30. "Consumer Education — A 'Must' for Elementary Schools," Eoucation for Victory 2: 4-6 and 22, August 16, 1943.

*31. Nasella, T.: "Daddy's Carfare," Paul Revere School, Revere, Massachusetts, Grade Four.

*32. Quattlander, Elizabeth: "The Cost of a Two or Three Weeks' Stay at Summer Camp," Supervisor Grade Four, Edgerly Training School, State Teachers College, Fitchburg, Massachusetts.

*33. Carter, Lena: "Fourth National Store," Weston, Massachusetts, Grade Four.

*34. Mullen, Mary B.: "Cost of My Education," George Street School, Leominster, Massachusetts, Grade Four.

35. Coulter, Carol: "Cost of Raising 250 Chickens," Brookville, Massachusetts, Grade Six.

36. a. Hennigar, Leah L.: "Informational Problem Units for a Sixth Grade: the Family Budget.

b. Howe, Florence R.: "Delving into Real Life Through Arithmetic Problems," Education 54: 477-478, April, 1934.

37. Upley, Milda M.: "Functional Problem Units for a Fifth Grade: Thrift."

38. Kett, Mary E.: "A Program of Individualized Problem Units," Education 61: 472-475, April, 1941.

39. Kett, Mary E.: "A Program of Individualized Problem Units."

40. Harap, Henry: "Eight Activity Units in Decimals."

*41. Lindquist, Evelyn: "Taking Stock of What We Have in Our Room."

*42. Cambridge, Doris: "Collection and Sale of Waste Paper," Supervisor Grade Four, Horace Mann Training School, State Teachers College, Salem, Massachusetts.

43. Harap, Henry: "Six Activity Units in Fractions."

44. a. Harap, Henry: "Six Activity Units in Fractions."

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*45. Mende, Pauline: "A Community Supper," Ware, Massachusetts.

46. State Department of Education, Tallahassee, Florida: "Arithmetic in the Elementary School," p. 87-88.

47. Robinson, Elizabeth W.: "What the Children Are Doing — We Sell Easter Eggs," Childhood Education 17: 311-317, March, 1941.

48. *a. Mende, Pauline: "A Candy Sale," Ware, Massachusetts, Grade Four.
*b. Perham, Mary V.: "A Candy Sale."
c. Wingate, Jeanora D.: "Arithmetic in Social Service," Education 61: 476-477, April, 1941.

49. Harap, Henry: "Eight Activity Units in Decimals."

*50. Lindquist, Evelyn: "An Ice Cream Sale."

51. State Department of Education, Tallahassee, Florida: "Arithmetic in the Elementary School," p. 75.

*52. Mannion, Margaret: "Our Toy Sale," Wilson School, Nahant, Massachusetts, Grade Three.

*53. Barlow, Elizabeth: Former Supervisor Grade Seven, Horace Mann Training School State Teachers College, Salem, Masschusetts.

54. Mackintosh, Helen K.: "What Do We Mean by An Adequate Elementary School Program?" Childhood Education 17: 154-157, December, 1941.

*55. Potter, Gladys: "Byrd's Snow Cruiser Goes Through Springfield," Kensington Avenue School, Springfield, Massachusetts, Grade Six.

*56. Keyes, Evelyn: "Arithmetic in the 1940 Census," Kensington Avenue School, Springfield, Massachusetts, Grade Six.

57. Kett, Mary E.: "A Program of Individualized Units."

* Units Starred are available at the Materials Bureau of the State Teachers College, Salem, Massachusetts.

Co-operation Among Colleges

TO OFFER A MORE INTELLIGENT PLAN FOR AN AREA, TO PREVENT DUPLICATION AND TO PRESENT A CO-OPERATIVE PROGRAM WHICH CAN BE BETTER JUSTIFIED AND FINANCED

By ELLIS HUNTINGTON DANA

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A CHANGING WORLD

IN privately endowed higher education, as in all other fields, the future is being made today. Leaders are continually looking, thinking and working with an eye to the future. Trustees and educators and large donors, of colleges and universities, are weighing this changing world, determined to preserve private higher education. The survival of privately endowed colleges rests largely upon their effective and efficient service and how they may come to co-operate.

It is not good, for instance, that five colleges in one metropolitan city should cultivate the same prominent citizens for an identical need. Each plans a new library, when a joint library might serve all five. It is becoming apparent that those givers who are still willing to make large gifts will not willingly support such duplication in higher education. More evidence of co-operation would inevitably encourage such giving, as has been shown by successful demonstration.

SURVIVAL AS AN ISSUE

The small independent colleges, even in New England, are facing a question as serious as that of survival itself. Low endowment yields, increasing taxation of all kinds, threats to tuition payments, fewer large donors, diminished enrollments arising from a world at war, great changes in Foundation grants, and other extraordinary factors, all indicate clearly that the colleges, and particularly the smaller ones, are on the verge of even greater difficulties.

It has been pointed out by certain authorities that, proportionately, the small colleges are making a very great contribution to the leadership of the nation even when compared with the larger universities and state colleges. Yet it has been shown that over a period of ten years donations to three large universities were four times as great as those to fourteen small colleges. A leader of one of the three big Foundations called the attention of the writer to the grants of his Foundation over the years. By far the largest bulk of these gifts went to larger institutions. When questioned as to the worth and work of small colleges and the prospects for Foundation grants, he had no answer. It is apparent, however, that the larger institutions have more research facilities and faculty members who can engage in research. In view of these considerations, small colleges must be all the more energetic and intelligent in presenting their cases.

It would seem, therefore, that the independent colleges, working together, must seek a solution of their difficulties, both present and threatened, through co-ordination and co-operation. By co-operation in interchange of students, by co-operation in faculty appointments and planning for courses, by co-operation in library resources and purchasing and in other similar ways they may meet in part the competition of the larger institutions. But perhaps even more important is a daring and willingness to innovate new educational theories and procedures and in this way stress education through small units and a highly personalized relationship with the students. Co-operation among independent colleges is certain; co-operation and mergers in other institutions, in business and industry and churches, now point the way for colleges. Yet few colleges are today willing to co-operate.

A NEW CONCEPTION

What threatens civilization today — American civilization — is not so much the war, but great underlying changes in fundamental conceptions concerning social institutions. Colleges will not be immune. To meet these threats, to preserve and foster their fundamental purposes, the colleges must recapture the dream of their real values and co-operate in education.

The flow of events is swifter and more violent today than ever before in history. Behind events are thinkers and leaders. We must co-operate in the education of leaders — we who believe that private education has an answer for these times.

HAPHAZARD PLANNING

In 1938, according to the American Council of Education, there were in the United States seventeen hundred colleges, universities, professional and technical, normal and junior colleges. Each institution has been following its own way with little regard for the others. The result has been competition for students, for prestige, for public favor and, above all else, for friends and funds. This question now is quite properly asked: In these times when co-operation and co-ordination are the watchwords in both private and in public institutions, local, state and federal, can such individualistic development and multiplicity of institutions in higher education be justified?

Some reasons for our present diffu-

sion of efforts may be found in the rapid growth of our nation. This was characterized by independence and a local pride of the pioneer. Faith in education and religion was most real. There was an ambition for a culture in every new community. There was a conviction that education was the best safeguard for freedom and democracy. These tendencies were always strongly individualistic.

Often the location of a school, college or university was determined by local interests, and was influenced by religious and economic purposes, by personal local advantages to student and graduate, or by difficulties of travel. Sectionalism and denominationalism brought rivalries, which encouraged the founding of more and more institutions. Tax exemptions granted by states, gifts made by influential local leaders, by local alumni and by wealthy churchmen, all contributed to increasing the number of privately endowed colleges and universities in America.

Colleges and universities, therefore, mushroomed haphazardly, without plan, without sufficient consideration of regional developments, and without adequate regard for the eventual financial support needed by all. An amazingly unintelligent and wasteful distribution of higher educational institutions in this country has resulted.

COLLEGES CLUSTERED

The American Council on Education, in a 1938 study, found so-called "college clusters," showing in sixteen states a wasteful clustering of all manner and kind of colleges. In 1938, in New York State alone there were one hundred and two institutions of higher education, of which ninety were found to be included in thirteen "college clusters." It is a proper question to ask: Are all these institutions necessary in order to serve an area?

From this, certain queries arise. Today there are many educational programs offered. There are varied and abundant transportation facilities available. There are tremendous national and world-wide economic and sociological factors which affect in unprecedented ways the financial support of privately endowed colleges and which at long last must be faced. Under these changes and under this pressure it is increasingly difficult to justify duplication in library and laboratory facilities, the building up of separate faculties and increases in separate administrative overheads.

LACKS IN TRUSTEES

It is true also that trustees, as to interests and backgrounds, are too frequently local and institutional. Trustees are too often lacking in adequate knowledge of the educational needs of the nation, of their own state, and even of their own locality. Too seldom do they know enough about the constituents of their own colleges. They have all too few contacts with other trustees from which associations and interchanges they might gain a broader perspective. It has been hard to develop broad educational statesmanship among trustees. Even though they are interested in education and devoted to the institution of which they are a trustee, they often have a woeful lack of perspective. Too often their decisions as trustees are grounded on local and individualistic considerations. There ought to be, therefore, increasing opportunities for trustees of different colleges to meet

each other and to discuss their common problems together. Such a cooperative procedure has already been successfully demonstrated by the annual conference for trustees held each spring at Lafayette College. The last session discussed the "Responsibilities and Problems of Governing Boards of Educational Institutions."

SOCIETY UNITS LARGER

It is a common fact today that industry and government are acting in larger units. This is so, among other reasons, because the great advances in transportation and communication have brought us closer together. We cannot serve our needs and each other adequately enough through isolated and individualistic organizations. In a radically changed world, can colleges properly stand the test of the times as to functional efficiency? More-over, when it is recalled again that tax exemptions to independent colleges are nothing more nor less than a grant on the basis of public service rendered, are these favored colleges giving modern public service?

In general, trustees, educators, friends, alumni and students of the colleges all touch on the circumference of the ever-present problem of financing the independent college enterprise. Larger social and governmental issues today have tended to turn the spotlight on institutional and educational complacency, which must be the concern of those who control college destinies. Basic theories are being tested and doubted and no longer can we rest on tradition. New trends and techniques, especially in the financial field, are bringing increasing pressures for sound plans and actions.

FACTS WITH VISION

The need is not so much a concern about balanced budgets today as it is for a more real attempt to justify expenditures within a balanced budget. There is increasing opinion that many courses are not needed, that courses and teachers should be more practical and that aims should be more carefully determined. It is, even more, the balanced budget five or ten years from now that should concern the college administrator today. Penetrating foresight and broad vision are greatly needed. It takes courage to face facts. It takes vision to plan. It takes fearlessness to act and to make changes.

It is true that Federal taxation threatens not only all givers, but even college tax exemptions, which have been taken for granted so long in our society. Endowments can be counted on less and less. Tuitions are high, and probably cannot go higher without turning away students. Enrollments are threatened. These and other factors call for analyzing as never before. Even more, the great inco-ordination in higher education must be reduced to its simplest terms and squarely faced. This demands the immediate and serious attention of educational and social statesmanship.

OBSTACLES IN THE WAY

There are many obstacles to cooperation in higher education. There is too much narrow institutionalism. There is too little emphasis on a study of modern administration theories and practices for colleges comparable to those studies and emphases accepted today as absolutely necessary for business and industry. There is, unfortunately, too much administration by "leakage" of pertinent information

among the five elements — trustees and corporation members, administrators, faculty, students and alumni. There are too many special interest groups, professional, business and alumni. There is too much sectarianism and denominationalism in the narrow sense among many colleges and universities in the United States. Church-related colleges as spiritual educational centers have a place. But these colleges must have clearer and more modern objectives and still broader and more socially minded programs. There is, strangely enough, too much politics in both public and private institutions. There are too many personal ambitions among administration officers and faculty members. There are great difficulties in administrative and course procedures. There are still many obstacles to be overcome in local, state and national education associations, both public and private, affecting privately endowed higher education. These organizations must first increase their co-operative activities, if the colleges are to co-operate increasingly.

DEMONSTRATIONS

Despite difficulties and obstacles, progress has been made. The following are some successful demonstrations of co-operation and co-ordination.

SWARTHMORE WITH OTHERS

Co-operation among Swarthmore, Haverford and Bryn Mawr colleges has already been achieved. More steps toward further co-operation have been considered. It is believed that the war emergency will stimulate action in both the scope and tempo of this joint undertaking. These three colleges are nearby each other geographically and have much in common in other ways.

At the present time, several departments of the three institutions are now arranging programs to meet vacancies created by calls to the national service of teachers from the three schools. This solution involves considering appointments largely in view of the needs of the three colleges rather than just one. The departments thus co-operating are those of physics, chemistry, biology, mathematics, economics and phychology.

These three colleges are also pushing forward their program of library co-operation, even to the point of considering a joint purchasing system for all the supplies of the three college libraries. This will result in a considerable financial saving, which is important these days.

For some time arrangements have been in effect whereby any student at any one of the three institutions may take any course at either of the other colleges without extra cost and with full academic credit from the institution at which he or she may be registered. This arrangement is also in effect between the University of Pennsylvania and the three colleges.

The Presidents of these three colleges meet every three weeks to plan the development of this co-operation. It is also interesting that, begun in an informal manner, their co-operation has now reached the stage where regular minutes are kept and where different aspects of co-operation are assigned to the responsibility of the individual colleges.

THE CLAREMONT COLLEGES

Another interesting demonstration of small independent college co-

operation is to be found in the Claremont Colleges, which include Pomona, Scripps and La Verne Colleges in Southern California. Organized in 1925 into a legal corporation, known as the "Claremont Colleges," this organization had for its purpose co-operation relative to the graduate programs, the summer school and in general, co-operation regarding such further arrangements as might prove of mutual advantage to all three.

Each of the three colleges retained its own administrative officers, its own Board and its own independence. Moreover, the "Claremont Colleges" arrangement has been designed to encourage as many co-operative activities as may be effective and economical in offering better educational service for a region.

The proximity to each other is doubtless one prime reason for the success of this co-operation. Yet, it is important to realize that this co-operation might not have been tried and that once tried it quickly demonstrated how three institutions working harmoniously together in a given region can overcome duplication and competition. Among other ways, the three colleges co-operate on student and faculty interchange, on courses and course planning, and on general goodwill cultivation, even to the point of having a joint group called "Friends of Claremont Colleges."

PRIVATE WITH PUBLIC

Since 1933, Duke University and the University of North Carolina have been co-operating and co-ordinating their programs.

This has included common action in bringing learned society meetings to the two campuses, joint seminars and other classes for advanced students, sharing the resources of visiting professors, joint sponsorship of distinguished visiting lecturers, participation in doctorial examinations, publications of books, and in other ways.

Noteworthy is the library co-operation between the two institutions. Initiated in 1934 by an exchange of catalogues, the co-operation has grown. A daily messenger service between the two has developed. Collections in various fields have increased rapidly. This co-operation has brought $50,000 from the General Education Board. The libraries have also co-operated in collecting local, state, federal and foreign government publications.

Duplications of purchases of library materials for graduate study and research have been avoided. Where one department is in one college and not the other, the library of the interested institution is expected to develop the collection in that field. When both have the same departments, correlation of purchases are made according to the interests of the separate faculties.

Graduate students of each school are at liberty to use materials of both libraries.

IN URBAN AREAS

Cleveland

Cleveland stands out as an example of co-operation among major higher educational agencies in a metropolitan area. This was achieved through voluntary association of leaders interested in various educational problems affecting Greater Cleveland and known as the Cleveland Conference for Educational Co-operation.

The Conference has been confined to the chief administrative officers of

eighteen Cleveland institutions. It is not a financial federation, nor a close administrative organization, but a functional federation to perpetuate continuous inter-institutional counsel upon matters of educational policy. Success depends upon the spirit of its members. Autonomy has been left to the institutions; the emphasis has been placed on a common objective in serving the community. The Conference has achieved greater co-operation in education for Cleveland through frequent consultations and careful planning.

Baltimore

Since early in the last decade, John Hopkins University, Goucher College, Peabody Institute, Maryland Institute, Baltimore Museum of Art, Walters Art Gallery, Enoch Pratt Free Library and Maryland Historical Society have tried to avoid needless duplication. Conferences are held toward this end among the executive officers of these institutions. In 1937, the Mayor of Baltimore even went so far as to create a formal organization of these executives with others from the city government. His purpose was to formulate plans for the improvement and extension of the cultural institutions in the city. To date, specific co-operation is seen in adult education programs, exchange of students, co-operative lecture and entertainment programs.

The unusual feature of this co-operation is that the city officials are encouraging these institutions to serve the Baltimore area more effectively and to popularize the opportunities for cultural progress and enjoyment among the people of the whole city.

Nashville

Co-operation in Nashville has taken place among Vanderbilt University and George Peabody College for Teachers and Scarritt College of Religion.

Co-ordination in library service and instructional programs provides for free interchange of work on junior and senior college and at graduate levels. A director of libraries is employed jointly and a union catalogue of the holdings of the seven libraries in Nashville has grown out of these joint efforts. There is an interchange of students and a co-operation which prevents a duplication of courses.

A $2,000,000 University Library Center has been built recently with a $1,000,000 grant from the General Education Board. This grant is indeed a tangible result of such co-operation.

Atlanta

Seven institutions of higher education for negroes exist in Atlanta, Georgia. Through co-operation three of these Atlanta institutions offer graduate men and women opportunities. For these three institutions the General Education Board has built a library building for joint use.

In Atlanta there are other demonstrations of co-operation. Emory University, Georgia School of Technology and Agnes Scott College are co-operating with each other. In 1933, these three made an agreement to unify and improve wherever possible their higher educational services.

These are further demonstrations of the modern forces and trends toward co-operation. It is interesting to observe, incidentally, that considerable Foundation money is going to

those who will co-operate to serve one area as a region. Such co-operation is only common sense.

AS THE TRENDS UNFOLD

Co-operations among colleges have been tried in a great variety in various parts of the United States. The growing list of these co-operations indicates certain trends are unfolding and shows the directions in which further progress may be achieved. The exchange of instructors, the joint presentation of the educational opportunities afforded by a group of institutions, co-operation in fund campaigns, joint use of physical facilities, pooling students and facilities in field work training, co-operations between college and a business or industrial firm or a governmental agency, joint maintenance and clearing house facilities in research, bibliographic resources, publication of various services and many others, as set forth in the 1938 study by the American Council on Education.

MORE CAN BE DONE NOW

A great deal more can be done than is now being done. There can be more interest shown in the wastes and inefficiencies of inco-ordination. There can be more attention given by influential educational leaders to seeking out information pertinent to the problems involved. There can be more demonstrations of co-operation among increasing numbers of privately endowed colleges. This colossal world struggle in which America is now engaged is indeed a prime incentive. Business as usual is out, even for privately endowed colleges.

The writer agrees thoroughly with the conclusions given in the 1938 booklet, "Co-operation and Co-ordination in Higher Education," published by the American Council on Education, and from which booklet many facts contained in this paper have been taken. Concerning co-operation among colleges, we can all study to advantage the following: possibilities of unified boards, voluntary co-operation among other organizations, mergers and consolidation possibilities, demonstrations of federations and affiliations, the functions and powers of state and national church boards, the co-operative experience of learned and professional societies, the legal problems involved, various co-operating agencies of the Federal Government, the professions and their needs, special service areas, especially urban and metropolitan ones, co-operation in research as between colleges, communities and foundations, college clustering in relation to educational needs of an area, educational foundations and educational co-operative demonstrations.

BEARING ON SUPPORT

In trends and perspective, co-operation among privately endowed colleges has a direct bearing on college financing and fund raising — in greater savings, greater strength and greater appeals. More co-operation among colleges by those which are in a position to co-operate must come as a practical answer for the needs of these days. Still more, privately endowed colleges are increasingly dependent for support upon the many rather than the few. Among other things, therefore, this calls for more co-operation in order to be in a position to meet the educational and plant needs of the many.

TODAY VERSUS YESTERDAY

What is proposed here in essence is an intelligent co-operation for those colleges which can co-operate. As America was growing it was natural for sturdy pioneers to want their community to be self-sufficient, even in educational opportunities. Moreover, local association with the higher educational cause bestirred a pride. The pioneer was ambitious. He wanted scholars and culture in his community. He had a conviction that education was the foundation of democracy and of his cherished freedom. Pioneering days in America demanded vigorous and resourceful individuals, as it demanded vigorous and resourceful communities.

There is no less need for such emphases today. But the times have changed. Old frontiers are gone. New frontiers are here. Today we live closer to each other in every way. Many of the things pioneers worked for are now best assured by planning, by co-operation and by consolidation. This is an age of human relations. This is an era for organizational co-operation, which is, after all, just modern pioneering. Today is different from yesterday. It is not just as individuals, but as groups of individuals that we must co-operate. Thus it is with all of the organizations in our social order in this greatly socialized epoch in American history.

The world, the nation and the states have shrunk in size. The interests of the individuals and the local community are now intertwined with the interests of the state, the nation and the world. Religious and economic purposes are served in broader ways. Sectionalism is far less than it once was. Sectarianism has given way to more fundamental considerations. The individual and society can no longer afford rivalries, even in education — it is too costly and unnecessary.

CO-OPERATION VITAL

Co-operation is an answer to isolationism in educational organization. Isolationism cannot live in a co-operative social order. Co-operation is the watchword today. Co-operative leaders must come first in order to have co-operative groups. So it is with colleges. Freedom and independence are precious. But the greatest freedom and the greatest independence come today through co-operation. That is the way to make sure that what private education offers can be more fully realized.

Common sense suggests it is best for our own individual interests to make privately endowed education safe for ourselves and for our children through co-operation before it is too late. For many colleges it is no more nor less than to stand together in co-operation, or to stand separately and encounter the mounting risks when the tides are flowing toward co-operation in government and other organizations. "By co-operation what shall we lose?" This is a question sometimes considered more important then, "by co-operation what shall we gain?" This is human psychology. As such it must be faced. But co-operation loses less than is gained in the long run. This is a proved fact.

A REASON FOR BEING

The privately endowed colleges had a reason at one time for being. They still have reasons for their existence.

But times have changed and with these changes, small colleges have lost a good deal of their impact. What has been fundamentally worthwhile must still survive. But if this is to survive, colleges must redefine this good in terms of the present and of the future. This process is constantly going on in industry, in government, in churches and in community agencies through their association with community funds.

A CHALLENGE TO LEADERS

The colleges must re-evaluate their aims, re-examine their services and reorganize in order to meet the present needs of this new era. Co-operation among many colleges will help to achieve this modernization.

A great responsibility falls on the leaders in our colleges, if privately endowed colleges are to survive. This is a challenge which cannot be sidestepped, but which must be faced with vision, courage and action.

SILVER BURDETT HAS A BIRTHDAY

Silver Burdett observes a gala occasion this year as the company reaches its sixtieth birthday. Edgar O. Silver, its founder, would scarcely recognize the offspring of the humble publishing business he set up in Boston in 1885. His list of one item, THE NORMAL MUSIC COURSE, has grown and expanded to include basic texts in the major subjects on both primary and secondary school levels, and Silver Burdett Company has emerged as one of the country's leading textbook publishing houses with offices in New York, Chicago, and San Francisco.

The publication schedule for 1945 is in keeping with the diamond jubilee. The year opened with the launching of a new basic reading series, LEARNING TO READ, by Nila B. Smith. In April, the sixty-year-old tradition of pioneering in the field of music was carried on as the Fourth Book of the NEW MUSIC HORIZONS series came from the press.

[EDITORIAL]

OBJECTIVITY *in* EDUCATION

By CARL G. MILLER

THE state superintendent was making a plea for the passage of a certain appropriation bill. It was superior to others, the state executive explained, because it prescribed a purely objective way of distributing state funds. No politics, no favoritism, could, under its terms, be employed by the state office.

This ideal of objectivity is of broad application in education. It needs encouragement. It needs the attention that human intelligence can give in a long series of evolutionary steps.

Objectivity is the guide to follow in rating the work of students, and it is in this direction where much can be done. At present, the rating of students in all kinds of schools is too subjective. Too much human judgment by the teacher is involved.

If progress toward objectivity in estimating students is to be made, much more needs to be done in the direction of testing. We need better tests. We need a better testing schedule. With the right tests, teachers can lean heavily on their results in judging the work of students. Much of the student's daily work, important as it is, is like the training of troops, the big question being: What will those troops do under fire? In education the big question is: To what extent has this learning, or training, or understanding become a part of the nervous system of the individual? To what extent does it really function in the student's living? In tests, properly conducted, the student is under fire; he is, or should be, on his own. Thus the test's results take on importance.

Teachers have a hard problem in judgment when it comes to knowing when to be subjective and when to be objective. The former calls for a personal touch, such as sympathy and awareness of the pupil as an individual. It is highly important. But when it comes to rating pupil achievement the objective method of measurement is the one to lean on. It is decidedly the safest for the teacher, since it almost eliminates complaints from students over grades.

Then there is the objective rating of a teacher by a principal, superintendent, or president. Schedules for estimating a teacher are common and represent an approach toward objectivity, but the way is wide open for better methods. For the work of a teacher the proof of the pudding is essentially in the eating, and that means that someone must measure the product; in other words the test of a teacher is probbably a new and fair way of testing what the pupils of that teacher have learned. Again the way goes back to improved student testing.

BOOK REVIEWS

The Idea of Nationalism: A Study in its Origins and Background By Hans Kohn. The Macmillan Company, New York. 1944. Pp. xiii, 735. $7.50.

This is a book for the serious student. It is the work of a scholar who has undertaken as his significant contribution to probe the idea of nationalism harking back to its origins among the Hebrews and the Greeks. It is a fragment of universal history, an introduction as it were to world history as the author has here isolated an element which runs through the warp and woof of all history illuminating the whole global scene. He points out clearly the significant contribution which this idea has made to world progress and the nations and peoples who have been responsible for it and the modifications which it has undergone. To the layman nationalism in the 1940's and even earlier represents something sinister and disruptive of peaceful international relations. Like so many ideas in the world it has been perverted and made to serve narrow and individualistic ends. Dr. Kohn clearly reveals what a beneficent force it was in its original form and its significant contribution to real progress, recognizing as it did the people as the source of power and the real architects of culture. He points out how significant was the role in its development which was played by the American colonies. This study but lays the foundation for later volumes tracing the idea through the succeeding centuries as the present volume closes with the outbreak of the French Revolution. The author has neglected nothing in the past which might provide a background or supply an explanation of the origin of the idea or reveal its true nature. It is not the sort of book to be read and then put aside; it is rather a companion volume for a better grasp of the great civilizations of the ancient, medieval and modern world and their relation to the contemporary world. It should provide a better perspective on these earlier centuries revealing how long and laboriously man has struggled to evolve our present civilization and how often he has lost sight of his goal to follow after false ideas and false gods. It has been said that the writing of a universal or true world mystery is much more than the piecing together of the history of England, France, America and the other portions of the world which have seemed to play a significant role in cultural development. Dr. Kohn has illustrated the real study which must accompany any such effort. In following this important aspect of intellectual history he has laid the basis for later synthesis which will in a real sense trace the rise and development of world culture. The author reveals a wide range of reading and research and has provided the reader with a wealth of references in this neglected field of intellectual history. After all it is ideas that rule the world as is illustrated by the present world war. It is not an easy matter to trace their germination or their spread. We are suddenly aware of their potency. Studies of this sort are therefore most welcome. Every teacher of history would do well to keep such a book at his elbow to be reviewed as he presents some of these phases of history.—DANIEL C. KNOWLTON.

Coaching Roads of Old New England by George Francis Marlowe, New York, The Macmillan Company, 1945. XVI and 200 page, $3.50.

In this fascinating book, Mr. Marlowe—professional architect, artist, and writer—tells the story of the inns and taverns of the old New England coaching roads. The author follows several of the principal routes of earlier: the Groton road through the old towns of Middlesex to Jaffrey and northward through some of the most

charming farming country of Massachusetts and into the mountain regions of lower New Hampshire; the Newburyport and Portsmouth road through historic Salem and the low country near the sea to Ipswich and Newbury; the upper Post Road via Springfield; the Lower Post Road by way of Newport through Old Lyme and the historic towns along the shore of the Long Island Sound. Mr. Marlowe confines himself to no particular period of history. He recalls episodes of pre-Revolutionary times, of the era of Washington, and of the days when our ancestors joggled over these highways on horseback, in jolting stage wagons, and later in the Concord coach. Mr. Marlowe introduces us to scenes in cozy bar and warm kitchen where our forebears cracked many an unrecorded story and commented on domestic and foreign politics. *Coaching Roads of Old New England* is a thoroughly delightful book.—WILLIAM P. SEARS, New York University.

Senior Mathematics by Harl R. Douglass and Lucien B. Kenney. Henry Holt and Company, New York, 1945. 432 pp.

According to the preface, "A student who masters a course based on this book will have, as preparation for college study, the equivalent of two years of high school mathematics, including the procedures basic to college courses in science and mathematics and business."

If the teacher is capable and resourceful, the above promise should be fulfilled with the upper 25% of high school pupils. The less capable pupils, led more slowly and taught by the appreciation technique, should attain a good general viewpoint on the value of arithmetic, algebra, geometry, even trigonometry, and their applications in business and industry.

The book opens with 25 pages of work on the fundamentals of arithmetic; this is supplemented by 60 pages in the last chapter of the book, designated as diagnostic and remedial but hardly meeting that requirement. There is work on approximate measurement, numbers in business and the daily papers, graphs and pictographs, problems of the usual textbook type, short cut, exponents and logarithms, and the slide rule. This closes the first 96 pages of the book. The treatments are brief and interesting. "Excellent" on tests in the fundamentals calls for 100% results.

The next 64 pages is devoted to algebra in an interesting and practical manner, — formulas and equations, negative quantities, the four axioms, parentheses, exponents, quadratics, progressions, the binomial theorem, with some specific applications.

There are 37 pages on percentage and interest, interest tables, applications. There are 45 pages on lines and angles, simple geometry, scale drawings, blue prints, and other applications. A chapter follows on measurements and how to make them. Another chapter deals with using triangles, and this leads naturally into simple trigonometry, sines, cosines, tangents, and the slide rule. Chapter 8 takes up the family budget, the bank account, cost of home ownership, insurance, income taxes, investments, and related applications. The final chapter on diagnostic and remedial work, referred to above, provides 60 pages of the usual text examples, but no real remedial program.

This worthwhile attempt at a modern program in general mathematics for secondary pupils, does not fully escape the traditional lags and hangovers of elementary and secondary mathematics, although it does go a long distance on the way. The rightly trained teacher will find the book useful, but she will make many adjustments. She will recognize metric as a fallacy and omit all metric drill. She will recognize that fractions with such denominators as 6, 7, 21, 17, 55, have no place in a drill program. She will omit the drill on decimal processes, substituting the appreciation technique. She will substitute functional problems for the mental discipline in problems. But, as ever, progress is slow, and a text-book must cater much to traditional demands. Revisions can follow.—GUY M. WILSON, Raytheon Manufacturing Company, (Professor Emeritus, Boston University).

NEW RECORDS

Christmas Hymns: Victor Chorale, with Robert Shaw, conductor. Victor discs 11-8672 and 11-8673. $1.00 per disc.

These two single discs contain a fine selection of Christmas hymns and carols, admirably sung, and most appropriate for school purposes. There are an even dozen of these glorious old traditional tunes of Christmastide, including such favorites as *Joy to the World, It Came Upon a Midnight Clear, O, Little Town of Bethlehem, Silent Night, God Rest You Merry, Gentlemen,* and the *Adeste Fideles.* These discs will find their way into many a schoolroom at Christmas time for years to come. The singers are the Victor Chorale under the leadership of that brilliant and unique young conductor, Robert Shaw.

Vivaldi: Sonata in E. Erica Morini, violinist, with Max Lanner at the piano. Victor disc 11-8671. $1.00.

Antonio Vivaldi was one of the great Italian composers of the seventeeth century. His compositions have come down to us today largely through the "arrangements" made of them by other musicians. No less a man than Johann Sebastian Bach, for example, arranged sixteen concerti for the clavier and four for the organ. The present violin sonata was arranged by the contemporary Italian composer, Ottorino Respighi, who died some eight years ago. The playing by Erica Morini and Max Lanner is splendid.

Handel: The Messiah, Hallelujah. Chorus and Behold the Lamb Sadler's Wells Chorus and Orchestra, Warwick Braithwaite, conductor. Victor disc 11-8670, $1.00.

Here are two of the most stirring and climatic excerpts from Handel's magnificent old oratorio, *The Messiah.* They are superbly sung as only the English can sing Handel by London's Sadler's Wells Chorus and Orchestra under Mr. Braithwaite's direction.

Puccini: The Heart of "La Boheme." Licia Albanese, soprano; Beniamino Gigli, tenor; Tatiana Menotti, soprano; Aristide Baracchi and Afro Poli, baritones; Duilo Baronit and Carlo Scattola, basses. La Scala Orchestra, Umberto Berrentoni, conductor. R C A — Victor Album D M-980. Five 12-inch records. $5.75.

Puccini's *La Boheme* is one of the great favorites of the operatic repertory. Moreover, it is a splendid work through which youngsters in our schools may be introduced to the treasures of operatic music. Puccini was young when he wrote this opera and Mimi, Rudolfo, Musetta, and the other characters of the opera are all young people. Puccini, after two rather dismal failures, was naturally attracted to Henri Murger's popular novel about the unconventional lives of artists and writers who starved in garrets one moment and in the next celebrated sudden bursts of prosperity wildly in public places. The present recording, "The Heart of *La Boheme*", is an abridged version of the complete recording of the opera that was made in 1937. For school purposes this recordrama is especially appropriate—all of the highlights of the opera have been preserved and the printed text in the album tells a great deal about Puccini and this opera, as well as presenting the Italian text and an English translation. Incidentally, it is reported that the famous old La Scala opera house of Milan, whose stars and orchestra combined to make this recording, has been reduced to ruins as a result of the war in Italy.

Single Discs

The Richard Rodgers music for the folk drama *Oklahoma* will live as long as music is heard and enjoyed in this land. On Victor 11-8742, the Boston "Pops" Orchestra, Arthur Fiedler conducting, is heard in an arrangement of selections of this colorful music ($1.00).